VOL. 16. NO. 7 REGISTERED IN U.S. PATENT OFFICE JULY, 1918

JUL 15 1918

THE METAL INDUSTRY

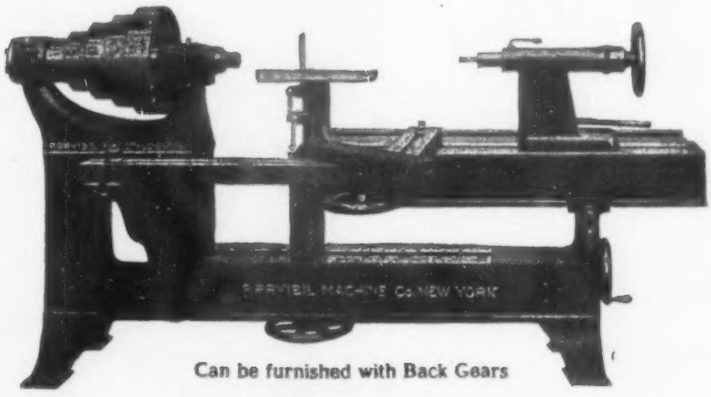
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW

Entered as second-class matter February 10, 1903, at the post-office at New York under the Act of 1879.

A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

SWING IT 27 INCHES or 60 INCHES!

A Big Machine for a Big Job



Can be furnished with Back Gears

Metal Spinning Lathes, Tools and Accessories for Round and Oval Work

SEND FOR CATALOG

Established 1862

P. PRYIBIL MACHINE COMPANY

512-524 WEST 41ST STREET, NEW YORK

CONTENTS, PAGE 321 DIRECTORIES, PAGE 69 WANT ADS, PAGE 78 INDEX TO ADVERTISEMENTS, PAGE 89

$1.00 Per Year 99 JOHN STREET NEW YORK 10 Cents Per Copy

STANDARD THE WORLD OVER

Users of Dixon's Crucibles take no undue risks. They have the satisfaction of knowing that when they use Dixon's they are using crucibles that are recognized as STANDARD the world over.

WRITE FOR FREE BOOKLET No. 12-A.

Made in Jersey City, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY

D X N ESTABLISHED 1827 D X N

DIXON

THE STANDARD IN CRUCIBLES

MANUFACTURED FOR OVER 50 YEARS

J. H. GAUTIER & CO., JERSEY CITY, N. J.

McCullough - Dalzell Crucibles

save money to all who use them—that's why more people use them every year. You will use them some day. The sooner you do the more you'll save. Write for prices.

McCullough - Dalzell Crucible Co.

PITTSBURGH, PA.

USE ONLY THE CHAS. K. SCHWEIZER CO.

MOULDS

Waterback and Plain

214 Vine St.

ST. LOUIS, MO.

SOLDER, BABBITT, LINOTYPE, TIN AND LEAD MOULDS.

Send your inquiries on special designs.

PHOSPHORUS

For Phosphor-Bronze, Copper, Tin, Etc.

GENERAL CHEMICAL CO. 1421 Chestnut Street PHILADELPHIA, PA.

KALYE

(Trade Mark)

FOR PREPARING METAL SURFACES FOR PLATING, &c.

SAMPLE CAN SENT FREE

Correspondence Solicited Mention this Journal

H. M. ANTHONY CO., Agent, 261 Greenwich St., New York

THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW

Vol. 16 NEW YORK, JULY, 1918. No. 7

AMERICAN ELECTRO-PLATERS' CONVENTION

A DESCRIPTION OF THE SIXTH ANNUAL MEETING, HELD IN DETROIT, MICH., AT THE HOTEL STATLER, JULY 1 TO 3, 1918.

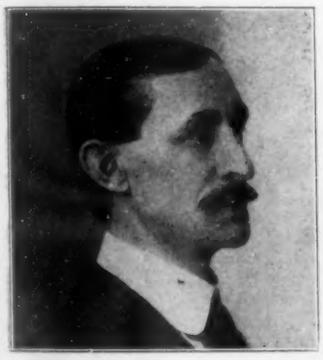
WRITTEN FOR THE METAL INDUSTRY BY FRED J. HUNTLEY, BUSINESS CORRESPONDENT.

Patriotism and a determination to stand by the government and President Wilson to the end, was the keynote of the sixth annual convention of the American Electro-Platers' Society which met in Detroit, Mich., beginning July 1 and ending July 3.

The prevailing war had a decided influence on all deliberations. The hall decorations were patriotic, and the speeches and discussions were of the same nature. Particular emphasis was laid on the fact that the American Electro-Platers' Society is as closely allied to the government in the production of munitions as any other tre parties, a ball game, etc., were conducted in a delightful manner. Individual discussions outside the meetings also were of great value; the delegates having an opportunity to exchange views and swap yarns freely throughout the three days. Many excellent papers were read, and the discussions were valuable in a technical way. It is apparent each year that this organization is more and more taking up the technical side of the business, in such a manner that proves the members are real scientists.

A new feature this year was the social side intended especially for the ladies. Most of the delegates brought

National Officers of The American Electro-Platers' Society—1918-1919



WALTER FRAINE
President.

PHILIP UHL
2nd Vice-President.

OSCAR E. SERVIS
Secretary-Treasurer.

H. I. RICHARDS
Editor.

in the United States or Canada, which country also had a large showing among the delegates. Even the address of welcome made by Mr. Divie Duffield, personal representative of Mayor Marx, was patriotic, wherein he exhorted the delegates also to prepare for peace in the time of war so there would be no interval of depression following and so that business would resume under normal conditions as quickly as possible when the great conflict should end.

Notwithstanding the grim war spirit which hung over the meetings, a strong spirit of fraternity and good feeling prevailed everywhere. The Detroit branch, with its able executives, were extremely effective in maintaining a cheerful and happy atmosphere. Particular stress was laid on the social end of the gathering, and a great number of special features in the way of pleasure trips about the city, boat rides, luncheons, theatre parties, a ball game, etc., were conducted in a delightful manner. Individual discussions outside the meetings also were of great value; the delegates having an opportunity to exchange views and swap yarns freely throughout the three days. Many excellent papers were read, and the discussions were valuable in a technical way. It is apparent each year that this organization is more and more taking up the technical side of the business, in such a manner that proves the members are real scientists.

A new feature this year was the social side intended especially for the ladies. Most of the delegates brought their wives, daughters or others closely related, and while the men were busy discussing problems in plating and problems in business, together with war conditions, the ladies were enjoying the automobile rides, shopping tours, theatre and dinner parties. It was the intention of the committee in charge to so interest the women in the organization that they will be an incentive to their husbands or fathers to attend meetings regularly and look after the interests of the plating industry at large. It is apparent from the manner in which the ladies were favored, it will be difficult for members to become disinterested or overlook their duty.

The first day opened with cool and somewhat disagreeable weather, but the enthusiasm overbalanced everything disagreeable due to nature's frowns. Many delegates arrived Sunday night, and nearly the entire representation was present when the roll was called Monday

morning in the convention hall of the Hotel Statler.

THE CONVENTION OPENS

The first session opened Monday morning with President Walter Fraine, of Dayton, Ohio, presiding. He immediately referred to the death of Arthur O'Keefe, which occurred in Detroit, June 28, and whose funeral was held on the day of the opening session. A committee was appointed to draft resolutions of condolence which, when suitably engrossed, will be forwarded to the family, the entire convention concurring in a vote of sympathy and regret over the loss of a valued and esteemed member.

A roll call of delegates followed during which Mr. Fraine paid tribute to the Grand Rapids, Mich., organization for sending fifty per cent of its members to the convention. He further said this was the baby branch, as it only recently had been formed and soon would be taken into full membership.

An echo of the year before came when the minutes of the previous meeting held in St. Louis, Mo., June 5, 1917, were read, bringing up reminders of the Mississippi and the Belle of the Bend, the steamboat that occasioned so much pleasure at that time.

At this time Mr. Fraine turned the chair over to E. G. Lovering, president of the Detroit branch, and of the Edmund & Jones corporation of that city. Mr. Lovering threw open wide the doors of Detroit, and in so many words told the visiting delegates to "go to it," as the Detroit branch was back of everything, that they need have no fear of anything, and that although Detroit was in dry territory, notwithstanding the city had ample facilities for intense enjoyment along other lines. It was announced at this time that owing to the fact that practically all Detroit plating plants and most of the other metal concerns were engaged heavily on munition work, government representatives had declined to permit promiscuous visits to these plants. In consequence the proposed trip had been given up. In its place, however, a ball game was arranged.

Divie Duffield, representing Mayor Marks, was introduced and at once opened the doors of Detroit, saying the city had no keys and was cordially opened to every organization such as the American Electro-Platers' society. In his welcome he declared that manufacturers, and those engaged in all lines of constructive work, should prepare for peace in time of war. It was time now, he said, to prepare for the big problems that will confront the nation when peace came and be ready to respond to the readjustment that surely must come, especially in material things. He laid particular stress on the need of re-education of the returned soldier who was the mechanic, the laborer and civilian before the war. Many, he said, would be physically incapacitated for work, and in order tto make these men producers, they must be shown how to live again.

A PANORAMIC VIEW OF THE DELEGATES, MEMBERS AND GUESTS OF THE AMERICAN ELECTRO-PLATERS' SOCIETY

George B. Hogaboom, first vice-president, from New Britain, Conn., responded to Mr. Duffield. He said members of this national body would leave Detroit with a feeling of pleasure in being permitted to meet in a city which was doing so much towards winning the war. Detroit, he said, is referred to as the city where life is worth living, and had found since coming here that Detroit has not only had made its own commonwealth a place where life is worth living, but at present is busily engaged assisting in making the world a place where life is worth living. He also said the spirit of this society stands back of the government in everything it undertakes towards winning this war. He also referred to the problems that now face the country, and stated the electro-platers stood by the government with its technical men and skilled scientists. He further said it was the determination of the delegates to go deep into the science of the plating business at this meeting and to dig up all the good points that will be valuable in pushing the war to a successful issue.

Reports were read by the secretary and treasurer, Oscar E. Servis, of Chicago, Ill., in which he showed the membership was well sustained and sufficient funds were on hand to meet all requirements.

While the delegates were in session, the ladies skipped about the city on a shopping tour, returning in time to meet for the big official photograph which is shown in this issue.

The afternoon feature Monday was the ball game. When this event was announced Col. Joseph H. Hansjosten, of Chicago, Ill., and "Bill" Stratton, of Bridgeport, Conn., stepped to the fore as captains, the former representing the West and the latter the East.

Hansjosten was on the job in a minute, and with a "Ty Cobb" spirit at once defied the East, "Bill" Stratton, and even the delegates who made no pretense of playing ball. He officially named his players the "Hansjosten Midgets," announcing they were supported by a full blooded bull dog and were invincible from catcher to pitcher and clear around the bases.

The Eastern team made up of men from New York principally, where they meet German submarines on Broadway with only a casual nod, took Hansjosten's defiance with only a little quiver and said, "Come on with your bull dog, your invincibles, your midgets, anything else running loose in the West."

With heads up and tails in the air, the players started for Belle Isle Park, where in the presence of the ladies and in full view of Detroit River traffic, they proceeded to slaughter. It was found that Hansjosten really told the truth, and his invincible "Midgets" waded right into the Eastern giants so effectively the latter were defeated by a score of 21 to 11. The decisions of "Bill" Schneider and "Little Giant" Willmore serving as umpires were accepted with but little open remonstrance, due to the presence of "Chief of Police" "Erney" Lamoureux, but

AT THE SIXTH ANNUAL CONVENTION AT DETROIT, MICH., JULY 1-3, 1918. THIS PICTURE WAS TAKEN

after the bull dog had been chained and the Chief of Police had departed, some of the brave ones were heard to say "rotten" a number of times as they drank coffee and talked about the weather.

All cheered up when lunch was announced, and one never would have known a ball game had been played when the scramble was made for the tables. The "eats" were good, thanks to the thoughtfulness of the Detroit branch which not once during the entire convention missed a chance to make everything a success. Following the lunch the automobiles were loaded and the return trip to headquarters was made.

The Monday evening session was purely technical, President Walter Fraine presiding, with three addresses delivered as follows:

"Wrong Conditions Corrected by Education," Herbert J. Hawkins.

"Hot Nickel Solutions," Royal F. Clark, Bridgeport, Conn.

Dr. W. Blum of the Bureau of Standards of Washington also spoke.

IN FRONT OF THE HOTEL STATLER, THE CONVENTION HEADQUARTERS ON WASHINGTON

TUESDAY THE SECOND DAY

Hearts of the delegates filled with joy Tuesday morning as they gathered on the dock of the Detroit and Belle Isle Ferry Company for the all-day's ride on the Detroit River, Lake St. Clair, the St. Clair River to the celebrated Flats called the Venice of America. The full delegation of about 260 was present. President Walter Fraine was there with his smile and so was C. S. Tompkins, secretary and treasurer of the Detroit branch with practically every member of the Detroit organization.

The skies had cleared from the day before when the southern delegates thought an arctic blizzard was about to come. The sun shone out as the boat pulled away from the dock, the dancing started with an orchestra assisted at times by the addition of members of the American Electro-Platers' society.

Mr. Fraine said he never knew the organization had so many talented musicians and added he never knew the organization had such graceful dancers. The frolics continued until long after the advertised time of starting the business session, and it was not until after eleven o'clock that President Fraine called the business meeting on the lower deck.

After considerable discussion the society went on record as favoring an appeal that is to be sent to various colleges and universities in different parts of the country, asking that these institutions open classes in chemistry in the interest of the electro-platers of the country, where young men and women could be trained for this particular branch of the business. This request was particularly made in the interest of young women who must from now on take the places of the men who are drafted

into the United States Army.

Dr. Blum, of the Bureau of Standards at Washington, particularly favored better instructions in the fundamentals of chemistry, as he stated he had noted decided errors in the formulas expressed even among skilled platers.

Edward Hale, the veteran plater, probably the oldest member of the convention and affectionately called "Daddy," declared he was sick of such expressions as H_2O when a plater meant a bucket of water. He was cheered for having the bravery to state his opinion.

A protest was received from the New York City branch against holding in good standing members who have neglected to pay dues promptly. Secretary Oscar Servis was opposed to placing any restriction on dealing with such persons as he said the non-payment oftentimes was only an oversight, and as soon as they were reminded of their duty the dues were promptly paid. He feared any change might seriously affect the membership of the organization. His opinion was concurred in by President Fraine and with no debate of consequence this matter was left to the discretion of the local branches, and in the future, even if a member has become delinquent a few months, his membership will be carried to the end of the year.

A protest was received from the Toronto branch against releasing to the trade publications, technical papers written by members before published in the monthly bulletin. This started a debate, the general opinion expressed being that the trade paper was a valuable adjunct of the plating business, and on a general vote it was decided to carry out the plan now prevailing that of permitting publication of such papers occasionally when sanctioned by the author with equal favors to all, no discrimination to be permitted.

At this time the Grand Rapids branch, a new organization, was admitted to full membership.

A proposition to amend Article 11, Section Eight of the constitution brought forth considerable debate. This amendment as carried reads as follows:

"No branches shall be permitted to solicit contributions for the purpose of financing any activity of the society from any representative or dealer in materials used in the plating industry."

This action was taken in order to protect the society from any unjust cricism that might arise in promoting any enterprise of the national body. A copy of this amendment, as here expressed, will be sent to the Federal Trade Commission.

Another resolution that met with disapproval was that from the Detroit branch, requesting that notice be sent to the supreme secretary at least two months before an annual convention is held, giving an estimate of cost of entertainment, the program, etc. The discussion that followed brought out the opinion that it was not for the

BOULEVARD. IT IS VERY EVIDENT THAT THE SOCIETY IS IN A MOST FLOURISHING CONDITION.

supreme body to make arrangements for the annual gatherings, this being strictly the duty of the local branch in whose city the meeting was to be held. The resolution was defeated. At this time an adjournment was taken for lunch. The boat had reached the St. Clair Flats and too much of interest for further business deliberation stopped further action.

The Walker Brothers' Catering Company of Detroit at this time served one of the finest lunches obtainable, under the direction of Mr. Walker personally. A box was delivered to each person in which was found a supply of everything to ease any interior craving. Coffee and ice cream followed, served by colored waiters. Dancing and fun followed until after two o'clock when President Fraine again called the delegates to order. The sun had come out hot and everyone by this time had become thoroughly thawed out. The limber legs of fat, thin and those between, had worked so vigorously on the dance floor that the afternoon attendance was full of pep. The program was made up of technical papers, one entitled METAL CYNIDES AND SODIUM CARBONATES IN BRASS PLATING was written by Jos. Birbaum of Milwaukee and read by Daniel Wittig, also of Milwaukee. This was followed by the usual discussion. It was here that Dr. W. Blum of the Bureau of Standards of Washington appeared as a chemist. He criticised in a brotherly way and as, heretofore, brought forth the necessity of a more thorough training in chemistry along fundamental lines. He said he doubted if eighty per cent of the platers today knew really the why of expressing chemical formulas in symbols.

John Hale of Cleveland gave a paper on "VALUE OF PROPER TANK ROD CONNECTIONS IN THE PLATING ROOM" and another was read by H. J. Hawkins, of Detroit, on "WRONG CONDITIONS CORRECTED BY EDUCATION."

An adjournment was taken to seven o'clock at the Hotel Statler convention hall. The remainder of the trip was devoted to dancing, frolic and watching the shore line. The boat was passing the great industries of Detroit and driven close to shore in order that delegates might see to better advantage. While passing the Detroit Shipbuilding Company, a new ocean going vessel plowed out into the river. It was difficult at first to tell whether it was going or coming. It was decorated with wide stripes running diagonally across the hull, a scheme to deceive the submarines.

It was at this point P. H. Bergen's poem was sung, accompanied by the orchestra, so vigorously that the little group in the lower cabin came to, and mounted the deck, forgetting the social gathering that had been in progress since some time in the morning. The boat passed the J. B. Ford plant at Wyandotte and then headed back to Detroit. It might be well to add here that the expense for the boat furnished for this trip was contributed by this company.

The landing was made promptly at 5:30, and the delegates dispersed for dinner, to gather again at seven o'clock for a series of papers on technical subjects; the ladies going to the theatre. An illustrated lecture was given by Mr. Ford of Worcester, Mass., on "ABRASIVES," the usual discussion following. Another on "DEPOSITION OF COPPER ON STEEL AND IRON DIRECT FROM ACID SOLUTION" was written by John Satka of Chicago and read by Fred Liscomb. Another was read on "ELECTRO ANALYSIS OF A BRASS SOLUTION," by J. V. Hearqueist of Cleveland, Ohio. This was followed by a talk on the ELEMENTS OF ELECTRICITY by Mr. Taylor, of Mattawan, N. J.

The meeting adjourned at 11 o'clock, in time for a heavy thunder shower, in which members of the Detroit branch were thoroughly baptised before they reached home.

WEDNESDAY THE CLOSING DAY

Wednesday morning the delegates were up and at it early. So keen had been the papers and discussions, interest had not lagged a minute. The auditing committee reported it had found the society's affairs in excellent shape and the secretary and treasurer reported a budget of $2,120.45 for the fiscal year of 1918 with a probable disbursement of $1,210.

At this time the president brought up the subject of re-incorporation under the laws of Delaware, stating the laws of that State granted more favors to such bodies as the American Electro Platers' society than any other. The laws of Delaware permits a corporate body to hold its annual meetings in any State in the Union, and this was what appealed to the supreme body. On motion, power was granted to re-incorporate under the laws of Delaware.

H. J. Richards, editor of the monthly bulletin, submitted a fine report which was accepted by a rising vote.

A committee appointed early in the convention to draft resolutions on the death of Daniel O'Keefe, of Detroit, reported at this time with resolutions of sympathy which were spread on the records.

Officers for the ensuing year were elected at this time as follows:

President, Walter Fraine, 507 Grand avenue, Dayton, Ohio.

First vice-president, S. P. Gartland, Rochester, N. Y.

Second vice-president, Philip W. Uhl, Philadelphia, Pa.

Secretary and treasurer, Oscar E. Servis, 5305 Warner avenue, Chicago, Ill.

Editor, H. J. Richards, 6230 Berthold avenue, St. Louis, Mo.

President Walter Fraine, Secretary and Treasurer, Oscar Servis and Editor H. J. Richards were re-elected All three responded with determination to aid in making the supreme body more efficient in the future than in the past. Mr. Richards especially responded in a patriotic way, declaring it is up to the electro-platers as a body to stand by the flag, government and President Wilson in every undertaking, to win the war.

Invitations were received from San Francisco, New York, Chicago and Philadelphia to hold the next convention in those places. So cordial was the invitation from Mr. Philip Uhl, the new second vice-president, that that city was selected over the others. At this point Mr. Uhl announced that his home was open to any soldier or sailor, related to any of the delegates present, who might visit Philadelphia.

The business session was concluded with a discussion on "PROTECTIVE COATINGS" after which a resolution was adopted which will be spread on the minutes and forwarded to the war department, asking the government to revise specifications so they will be better adapted for commercial application.

A resolution was adopted at this time, commending and thanking the Detroit branch for the magnificent program and entertainment. The resolution set forth that the local committee had not failed in a single thing that would make the meetings enjoyable and successful.

An adjournment was then taken for lunch, this concluding the business deliberations for 1918.

The ladies were invited as guests of the Detroit branch to a luncheon, while the men sought their own pleasure. Following the luncheon an automobile ride was taken about the city, participated in by both men and women. Following the ride, adjournment was taken until the

banquet in the evening when about 200 or more delegates and their guests were treated to one of the finest programs of the convention.

EXHIBITORS AT THE CONVENTION

The following maintained fine exhibits at the convention hall:

E. J. Woodison, Detroit, Mich.
E. J. Wagner, Detroit, Mich.
J. B. Ford, Wyandotte, Mich., represented by A. J. Ratz.
Detroit Stove Works, represented by Charles Cequin.
Oakley Chemical Co., represented by Mr. Aston.
Norton Co., Worcester, Mass., represented by Mr. Green.
Divine Bros., Utica, N. Y.
Long Manufacturing Co., represented by Mr. Phelps.
National Cash Register Co., represented by Walter Fraine.
Eureka Vacuum Cleaner Co., Detroit, represented by Mr. Schultz.
Crown Rheostat & Supply Co., represented by Mr. Wellmore, Chicago, Ill.
Frederic B. Stevens Co., Detroit, represented by Mr. Krentz.
Packard Motor Car Co., represented by Mr. Avery.
Charles F. La Hommedieu & Sons, Chicago, Ill.
Oliver Typewriter Co., represented by Mr. Wicks.
Bausch & Lomb Optical Co., Rochester, N. Y., represented by Sylvester Bartlett.
Stanley Manufacturing Co., Dayton, Ohio.
Penberthy Injector Co., Detroit, represented by A. J. Fritz.
The Apothecaries Hall Co., Waterbury, Conn., represented by E. A. Ireland.
Remington Typewriter Co., Ilion, N. Y., represented by D. W. Robinson.
Edmund & Jones Corporation, Detroit, Mich., represented by E. G. Lovering.
Ridge & Beech Mfg. Co., St. Louis, Mo., represented by John T. McCarthy.
Musich Plating Works, St. Louis, Mo., represented by E. J. Musich.
Celluloid Zapon Co., New York City, represented by H. J. Flanigan.
The Electro Zinc Rust Proof Co., Detroit, represented by Alfred T. Wagner.
Kemp & Bilicki, Milwaukee, Wis.

Among these exhibits was one in operation, doing plating and maintained by Frederick B. Stevens, of Detroit, Mich.

The Detroit local board gives great credit for this fine convention to the ladies assisting. They were on hand on all occasions and were principally responsible for entertaining and directing the visiting women.

Further credit is given to C. S. Tompkins, of the local branch, for his skill and efforts in handling the delegates. His ability in this line is unquestioned.

The oldest delegate present was Edward Hale, aged about 70. He is affectionately called "Daddy" and believes in calling a spade a spade.

ECONOMIES IN USE OF TIN

SAVINGS FOUND IN BABBITT MANUFACTURE, OTHER ALLOY CASTINGS AND IN SOLDER.

The Tin Section of the War Industries Board at Washington, D. C., has issued the following statement:

EXPERIMENTS TO FIND ECONOMIES.

"On account of the limited supply of tin available in the world to-day and because of the hazard involved in connection with our oversea imports upon which we depend for our requirements, and furthermore, because our war program calls for a very large tonnage of tin, it is imperative that we take immediate steps to husband our resources: First, by eliminating all waste; second, by substituting other metals wherever practicable; third, by reducing the percentage of tin used in various alloys just as far as possible, and finally, by recovering larger quantities.

"The War Industries Board has conferred recently with representative manufacturers of babbitt and other bearing metals, solder and miscellaneous tin-alloy products for the purpose of explaining the present situation, and in order to obtain suggestions as to the most practicable methods for conserving tin. In co-operation with the Bureau of Standards, a number of experiments have been conducted. * * *

"The accompanying statement reports some of the findings of the Bureau of Standards resulting from their experiments and from inquiries made among a number of large manufacturers and consumers. We realize that these suggestions cover only a few means of reducing our consumption of tin. The War Industries Board will gladly welcome others, particularly as it is expected that each recipient will be influenced in his approach to the problem by consideration of the special needs of his own line of products and manufacturing equipment. It is hoped that the very widest possible use will be permitted of any original findings that may result from a careful study of the problem."

The suggestions for conservation of tin above referred to are as follows:

BABBITT AND OTHER BEARING METALS.

Many specifications for bearing metals now in existence call for virgin tin (Banca or Straits). A large saving of these high grades of tin could be brought about by allowing the use of second quality pig tin in making tin-base babbitt. Detrimental impurities could still be limited but lead could be allowed to a maximum of 1 per cent. This would not be harmful in any way to a tin base or lead-base lining metal.

There is no question but that the tin content can be reduced somewhat in all bearing alloys. In a few cases, such as for airplanes, crankshaft bearings, etc., it may not be feasible to reduce the tin content by any but a small percentage, whereas in other cases it can be cut down very considerably. In the present emergency every possible saving, however small, should be effected.

For those cases where genuine babbitt is now used and which requires a very high grade of lining, alloys such as the following are suggested:

	No. 1, Per Cent	No. 2, Per Cent	No. 3, Per Cent	No. 4, Per Cent
Tin	85	84	65	62
Antimony ..	10	8	..	..
Copper	5	8	3 to 6	4
Zinc	..	..	28 to 30	33
Aluminum ..	..	..	..	1

One large bearing metal manufacturing concern states that the tin should be reduced in favor of lead. Lead-

base linings can be used in many cases where tin-base linings are now used, and in general are just as satisfactory. Many manufacturers already use the lead-base metals, but their use could be made more universal. Several special types of lead-base linings, hardened with alkali or alkali earth, are reported to be giving very satisfactory service in the place of high tin babbitt.

One firm states that it is using the following composition instead of Nos. 2 and 3 above in order to conserve tin:

Substitute 2	Per Cent	Substitute 3	Per Cent
Tin	8	Tin	5
Antimony	8	Antimony	7
Copper	4	Copper	2
Lead	80	Lead	10
		Zinc	76

These have apparently been found to do the service required of the tin-base linings in machine tool work.

Another large manufacturer of machine tools does not use lined bearings at all, believing that bronze alone is sufficient. There is probably no question, however, but what the lined bearing is cheaper because of the less amount of machining necessary in making the bearing. It is also claimed that the cost of replacement of a lined bearing is less than that of a bronze bearing and has to be made less frequent. One way in which a lining metal can be saved is to use just as thin a lining as it is possible to have in order to maintain a high enough temperature during pouring to ensure a firm bond and solid mass of metal.

In place of a bronze used for bearings containing 80 per cent copper, 10 per cent tin and 10 per cent lead, the following might be substituted as having been thoroughly tried and found satisfactory:

	No. 5 Per Cent	No. 6 Per Cent	No. 7 Per Cent	No 8 Per Cent	No. 9 Per Cent	No. 10 Per Cent
Copper	81	79	74	64	*	*
Tin	7	5	5	5	8	5
Lead	9	15	20	25	15	17½
Zinc	3	..	..	..	1½ to 3	5
Antimony	..	..	..	5	..	..
Phosphor copper	1	1	1	1	..	..

*Remainder.

With the co-operation of all in consideration of the above suggestions, it seems probable that much less tin could be used in bearing metals without in any way impairing their service. It is believed that a saving of at least 25 per cent could be brought about by a judicial selection of the proper composition of either bronze or lining to use for each particular service and insisting upon its use.

SOLDER.

There is apparently very little excuse for using a 50-50 solder or higher tin solder for any purpase whatever except in the matter of appearance of the finished article, and in the present emergency this is of secondary importance.

For hand soldering with an iron 45-55 will answer for all purposes but for most purposes 40-60 will be satisfactory. Wiping solder used by plumbers should not contain over 37½ per cent tin, whereas many are now using 40-60.

Can manufacturers and canners by adopting proper machinery can use 37½-62½ solder with satisfactory results. Very little solder of a higher tin content need be used in these industries.

Manufacturers of radiators need not use solder above 40-60 and in a majority of cases 35-65 will be found entirely satisfactory, and often lower tin content can be used, providing the solder is kept free from antimony. The use of pure tin in radiator construction appears extravagant. If this is used merely for tinning purposes, preparatory to soldering, the eutectic of tin and lead—63 per cent tin and 37 per cent lead—will be found to serve the purpose just as well. This should, in fact, be used generally where it is necessary to tin an article before soldering.

(In all of the foregoing paragraphs on solder the figure first mentioned refers to tin. For example, 40-60 means 40 per cent tin, 60 per cent lead.)

The possibility of using cadmium as a substitute for tin in solder appears promising. Laboratory and manufacturing tests, made by the bureau and by some of the large users of solders, have given good results. Among others the composition containing 80 per cent lead, 10 per cent cadmium and 10 per cent tin has shown particular promise. The board will be glad to report more fully on this phase of the subject as soon as further commercial tests of cadmium solders have been made. No difficulty is anticipated in connection with the production of cadmium on a commercial basis at a price considerably less than tin as soon as it has been demonstrated that its use for this purpose can be generally extended.

RECOVERY FROM SKIMMINGS.

Probably most large consumers of both solder and babbitt metals save their skimmings and residue. In the present emergency, small consumers as well as large should make a special endeavor to see that all metal in this form is recovered. It is believed that the aggregate that is lost through these skimmings not being saved is considerable, and that with a full appreciation of the importance of saving such metal, the gain will be appreciable.

TIN ALLOY CASTINGS, BRONZE, ETC.

It is believed that the percentage of tin in most alloy castings is unnecessarily high. It has furthermore been found that aluminum, bronze, steel, brass or other materials can often be substituted in the manufacture of tin-alloy castings. Wherever possible the percentage of tin in the alloy should be reduced or another metal substituted.

It has been stated that it is a common but questionable practice in brass foundries to look upon tin as the cure for most troubles encountered in the production of brass and bronze castings. In view of the present situation brass and bronze foundries are requested to curtail the consumption of tin wherever possible and to restrict its use to the proved essential needs.

CYANIDE BLACK SOLUTION.

There are several ways of producing a cyanide black solution.

1—A solution may be prepared as follows:

Water	1 gallon
Sodium cyanide	¾ ounce
Copper cyanide	½ "
Arsenate of soda	2 ounces

or more until a uniform black color is produced.

Anodes of sheet iron may be used.

2—Hot water 1 gallon
Caustic soda 6 ounces
White arsenic 2 "
Sodium cyanide ½ ounce

Use 2 to 3 volts with either of these solutions, as an excess of current will produce a gray tone.—C. H. P.

THE DEPOSITION OF NICKEL UPON CAST IRON FROM A HOT ELECTROLYTE

A Paper Presented Before the Sixth Annual Convention of the American Electro-Platers Society Held at Detroit, Mich., July 1-3, 1918.

By Royal F. Clark, Foreman Plater Acme Shear Company, Bridgeport, Conn.

In the following resumé the writer will give some data collected while operating ten tanks of hot nickel solution, each tank having a capacity of 135 gallons of electrolyte, for a period of over two years.

The plating room consists of thirty-eight nickel-plating tanks having a total capacity of 4,346 gallons of electrolyte, 1,134 anodes of 90-92 per cent purity, each anode weighing 10 pounds; there being 11,340 pounds of nickel anodes suspended in the solutions. Three motor generator sets furnish the current, one 500 and 1,000 ampere, 6 and 12 volts, three wire system; one 1,000 ampere at 6 volts and the third 600 amperes at five volts, two wire system.

The hot tanks are heated with lead steam coils, with a reducing valve to allow five pounds pressure to enter the coils. Insulating joints are inserted in the iron pipe above the solution at both ends of the tank; a steam trap is also used at each tank. All tanks are lead lined and some have been in use for over twenty-five years and have never leaked. Some of the solutions are made up of double salts and some of single salts. Each tank has a modern rheostat with ammeter and voltmeter attached and all of the thirty-eight tanks are running ten hours per day continuously every working day in the year.

The work, which consists of cast-iron shears and scissors are electro cleaned and each and every blade, after being nickel plated, must have its cutting edge sharpened or "struck" (on a solid emery wheel) as it is called, in the shear factory. Hence, the need of a soft deposit of nickel. If much hydrogen is deposited along with the nickel, peeling is sure to result when the shears are "struck" or if the current density is too high or the electrolyte has a high free Sulphuric Acid (H_2SO_4) content, the nickel deposit will also peel. A temperature of 38 degrees Centigrade (100 degrees Fahr.) is maintained, but tests were also made at 50 degrees Cent. (122 degrees Fahr.) and 58 degrees Cent. (136 degrees Fahr.) with excellent results.

The electrolyte consists of Nickel Sulphate (14 oz.), Sodium Chloride (1 oz.) and Boric Acid (3 oz.), with 2.8 ounces of nickel metallic content per gallon. An analysis of each solution is made on the first of each month for nickel content and it was found that .2 of an ounce of nickel was lost during a period of fifteen days.

Tank No. 25 was run daily for three and one-half months under strict analysis with the following results: From August 1 to October 15 nothing but hot water (H_2O) was added to the solution under test.

August 1—2.5 ounces metallic nickel 1 gallon.
August 15—2.3 ounces metallic nickel 1 gallon.
September 1—2.1 ounces metallic nickel 1 gallon.
September 15—2.0 ounces metallic nickel 1 gallon.
October 1—1.897 ounces metallic nickel 1 gallon.
October 15—1.86 ounces metallic nickel 1 gallon.

On October 31 a definite amount of Nickel Sulphate ($NiSO_4$) was added with the intention to raise the metallic content to 2.8 ounces per gallon, but the result analyzed 2.7428 ounces, which shows a discrepancy of .0556 ounces. It is apparent then that for all practical purposes that the following method of analysis for nickel content is quite accurate.

November 1—2.7428 ounces metallic nickel 1 gallon.
November 15—2.5296 ounces metallic nickel 1 gallon.

The method of analysis is as follows: Assuming that there is 15 per cent of metallic nickel in double nickel salts and 20 per cent in single, but to be exact it is 14.87 per cent and 20.91 per cent, respectively. Make a gallon of standard nickel solution of definite proportions, also a standard Potassium Cyanide (KCN) or Sodium Cyanide (Na CN) solution (2 ounces of cyanide to 16 ounces of H_2O). Fill a 50 cc burette with the standard nickel electrolyte, also fill a 50 cc burette with the standard cyanide solution. Into a 250 cc beaker draw 10 cc of nickel solution add very carefully and with stirring, drop by drop 26 degrees aqua ammonia until the green color has turned to blue. Now titrate this blue solution with cyanide solution, stirring vigorously, until it becomes clear. Be careful when nearing the end point and add just sufficient to clear.

Take a reading of the burette from which the cyanide was drawn. This is used to divide into the nickel metallic content of the standard solution, which should be determined, the results of which is the factor. The number of cc of cyanide used to clear the solution times the factor gives the number of ounces of metallic nickel per gallon. Always use the factor found with the standard solution when analyzing a solution made from the same proportions as the standard electrolyte.

For example—A nickel bath is made as follows: One gallon water (H_2O), 7 ounces double nickel salts, 2 ounces single nickel salts, 1 ounce Sodium Chloride (NaCl) and 1 ounce Boric Acid (H_3BO_3).

15%	metallic nickel in double salts.		
7	ounces.	.20%	nickel in single salts.
1.05	ounces.	2	ounces.
.40		.40	ounces.
1.45	ounces total metallic content.		

Assume then that it required 11.2 cc of Sodium Cyanide (Na CN) solution to clear the nickel solution then 1.45 ounces divided by 11.2 cc equals .129, the factor. If, for instance, at the end of two months the above solution analyzed 9.6 cc, this multiplied by the factor .129 equals 1.2384 ounces of metallic nickel per gallon. When analyzing always make 5 titrations using the entire 50 cc of nickel electrolyte then secure the average cc by dividing by 5.

The advantages obtained by operating a hot nickel electrolyte are as follows:

1. The resistance of the bath is decreased.
2. Permits the use of a higher current density at a lower voltage.
3. The nickel deposit is much softer and easier to buff, also the liability of the deposit to peel when the edges are struck, as in the case of shears, is much less.
4. The anodes dissolve more freely.

In a cold bath a deposit of one-thousandth of an inch is obtained in one hour, while in the hot bath one and a half thousandths is secured in one hour. The plating of shears does not permit the use of a high current density, therefore, no attempt has been made to secure rapid deposits.

The author has operated the hot nickel plating bath recommended by Dr. O. P. Watts with excellent results, and in plating some auto hub caps ran the solution at 93 degrees Cent. (200 degrees Fahr.). A seven-minute deposit, the work being agitated, withstood the cutting down of the nickel on a sixteen-inch buff wheel and also coloring on a fourteen-inch wheel.

THE CARE OF THE BRASS FURNACE

A Report of the Experience of a Large Foundry with High Melting Point Metals.

Written for The Metal Industry by J. A. Fletcher, Jr.*

Since the great European conflict has started, difficulties of many sorts are confronting the Nickel Silver founder daily. The crucible question is ever present, and will probably continue to be a much mooted one for some time to come; for despite the assertions made by crucible makers, their products are still far from satisfactory. In addition to the high cost of crucibles we face the expense of installing the lining in the pit furnaces, and their upkeep. Fire brick of all descriptions show a decided variance in their ability to remain firm and withstand the continuous effect of the heat. In times past the quality has been more or less constant, but similar to other commodities, demand and lack of supply has forced the kilns at times to ship brick not thoroughly seasoned and baked.

In relining a battery of furnaces, our policy has been to sort out the best brick for that part of the furnace which receives the most severe contact of the flame; the remainder of the lining being finished up with bricks not up to standard. Any furnace which is subjected to forced draft and one in which the metal is required to reach 2,500 degrees before pouring, has severe work imposed upon it. Consider the cost of upkeep on a battery of ten fires when new linings (only the brick) initially cost six and nine dollars a set.

Good foundry practice would argue that each fire should be repaired after the days run, but owing to the high prices prevailing on carborundum and high temperature cement, we concluded that once a week would suffice. However, we soon discovered that our forced draft made it imperative to repair daily, whereas if we had been using a natural draft and melting brass, our conclusion would have held good to a great extent. In repairing weekly, we used combinations of fire clay and carborundum sand, fire clay and silica sand, and various makes of high temperature cements.

The first mentioned combination with carborundum at four cents a pound, proved to be too costly for a daily appliance. The second formula was more satisfactory from the standpoint of longevity and cost. The heavier the proportion of silica up to a certain extent the better the patching stood the flame, as the fire clay supported by the sand did not have a tendency to crumble away. High temperature cements exceeded the other formulas considerably in cost, and the results were, in many cases, not as beneficial.

While we were well satisfied with the silica sand and fire clay, for weekly repairing, daily applications made us investigate still further for a cheaper and yet durable lining. Molding sand moistened to a mushy consistency and common clay, such as is obtained from excavating, were tried. Of the two, the clay gave the best results withstanding the heat so well that patching every night was discontinued for every second night instead. The molding sand figured at $3.50 a ton against the clay at $1.00 a ton.

1 2 3 4

SAMPLES OF FURNACE LININGS SHOWING THE EFFECTS OF VARIOUS COMPOSITION PATCHES.

The figures below give an idea of the relative merits of the compositions mentioned.

Figure 3 is typical of linings cared for by carborundum and fire clay. While the brick has worn uniformly, it has become so thin inside of two months' use that relining was necessary.

Figure 4 illustrates the effects of fire clay and silica sand as a patch. These bricks were in better condition after being subjected to the heat the same length of time as Figure 3.

The bricks shown in Figures 1 and 2 were removed after two months of continuous usage. It can readily be seen that these bricks are good for some time to come, for they were only removed to compare with Figures 3 and 4. These bricks were coated with ordinary clay twice a week. Several other furnaces treated in this manner are still in use and are finishing their fifth consecutive month of hard service. While the walls in these furnaces at present are undoubtedly thinner than those shown in Figures 1 and 2 their usefulness is still apparent, for the iron drum is not burned through.

*Superintendent Sterling Sales Company, Auburn, Ind.

INSTITUTE OF METALS OF GREAT BRITAIN

A Portion of the Presidential Address of Prof. H. C. H. Carpenter, M.A., Ph.D., Assoc. R.S.M., F.R.S., Delivered at the Annual General Meeting Held in March, 1918.

THE HISTORY OF THE INSTITUTE.

Scarcely more than ten years ago—the exact date was February 8, 1908—about a dozen men met in a solicitor's room in the city of Manchester to discuss the possibility of founding an institute for the purpose of advancing the scientific and technical study of the engineering side of non-ferrous metallurgy in this country. The impetus to this meeting had been given by a letter from Mr. Robertson of Bedford to Engineering. Many of us, I imagine, had long felt the great need for the existence of an institute which should endeavor to do for the non-ferrous metals what the Iron and Steel Institute has done for iron and steel, but it is right we should acknowledge that the first step taken toward its realization was Mr. Robertson's letter. Today in addressing, as I now have the honor to do, the Institute of Metals, which has a membership of more than 900 spread far and wide over the earth, a record of most distinguished past presidents and a Journal which takes its place among the best metallurgical publications of the day, it is impossible to avoid the reflection that in 1908 we were more than ready for the establishment of such an Institute, and that Mr. Robertson's letter acted with the swiftness of a crystal placed in a supersaturated liquid in giving the impetus to its formation and wonderfully rapid growth.

Young though we are, however, death has removed several who labored zealously for the Institute in the early days, whose services should always be kept in grateful recollection. May I recall to you two names? The first is that of Sir William White, our first president. It was he, I remember, who, when we consulted him about the organization of the new Institute, insisted on the necessity of having represented on the Council, and in approximately equal proportions, those who manufactured metals and alloys, those who used them, and those who studied their scientific properties in laboratories and research institutions. In taking this stand Sir William White made himself responsible for a policy which I believe more than anything else has conduced to the rapid, fruitful and harmonious development of the Institute and has given it its special character. I would like to put the matter somewhat colloquially by saying that we have fair play as between our various elements, and I think I may add that we are in consequenec a happy family. Most of us—indeed I hope I may say all of us—who are actively in touch with the work of the Institute must, I think, feel how much we owe to the intercourse we have with members representing other aspects of metallurgy than those with which we have normal daily contact in our own work. At any rate, speaking for myself, I gladly testify to the educational benefit I have received from meeting and discussing metallurgical problems with my fellow members in this way, and I think there are many others who would gladly bear the same testimony. In my opinion, therefore, it would be difficult to overestimate the importance of the policy for whose adoption Sir William White more than anyone else was responsible. His great services to us rendered during his two memorable years of presidency are still fresh in our recollection, and I am, I think, sure of your agreement when I say that by reason of his ripe experience, rare judgment, scrupulous fairness and genuine sympathy with all branches of our work, he constituted as nearly perfect a president as we could have had.

My second name is perhaps not so familiar to you. It is that of Mr. W. H. Johnson, of Manchester. I was privileged to act with him as co-honorary secretary to the Institute in the first day of its existence. He took the chair at the inaugural meeting in Manchester, to which I have already referred. I do not think there is anyone who can testify with as much knowledge as I possess to the devotion and zeal with which he served the Institute for the first six years of its existence, up to the time of his death, four years ago. During much of this period he was in failing health, but it never prevented him from showing his deep interest in the welfare of our body, and he labored with unstinted effort up to the end. He did not live to be, what he had so richly earned, one of our presidents, and I think therefore that his services to the Institute, so unselfishly rendered, should be held in special remembrance.

The Institute has been splendidly served by the presidents who succeeded Sir William White. Let me just mention their names in choronological sequence: Sir Gerard Muntz, Professor Gowland, Professor Huntington, Sir Henry Oram, and Sir George Beilby, all of them men greatly esteemed in their professions, who, each in his own particular way, and representing in the aggregate our three main types of membership, has contributed notably to the advancement of the welfare of our body and helped to bring it to its present position. May I also add a few words of appreciation with regard to the services of our secretary, Mr. Shaw Scott? When the growth of the Institute had reached a point at which it became impossible for the honorary secretaries to cope with all its requirements—which it did in the late summer of 1908—the Council decided to appoint a paid secretary, who should give the greater part of his time to the work. I remember that we advertised and received more than 100 applications for the post. It fell to me to go through them and make a short list for submission to the president, and I recall doing this on my summer holiday in a little inn in one of the remote islands of the Hebrides, where it required something of a mental effort to realize that there was such a thing as metallurgy at all. Mr. Shaw Scott was placed on the short list of six, and the president's choice fell on him. It was the right decision. He has served us faithfully and with remarkable zeal and good will, and to him much credit is due for the favorable position in which we find ourselves today. Up till the end of last year, while giving us the greater part of his time, he was also engaged in technical journalistic work, from which the Institute as well as he himself have derived distinct benefit. I am very glad, however, to be able to inform you that as from the beginning of this year the Institute has commanded his whole-time services, and we anticipate that the results of the new arrangement into which we have entered will be very beneficial both to him and to us.

I desire to thank you for the great honor paid and confidence reposed in me, in your choice of myself as your president. It is not easy—in fact, it is impossible—for me to say how highly I prize this. I must plead guilty to having had a certain amount to do with the formation and development of the Institute, and I gladly take this opportunity of saying that no work I have ever been privileged to do has given me greater satisfaction or appeared to me to be more worth doing than my small share in bringing about our present position. May I add that I desire to do everything in my power to maintain the dignity and advance the welfare of the Institute to which we are so much attached? In attempting to do this I know

that I may rely on the loyalty and active support, not only of the Council, but of the members as a whole.

Before passing to the main subject of my address, I should like to allude to three features of the life of the Institute which appear to me to merit comment.

In the first place, if I were asked—and I sometimes am asked—to justify our existence today by a single test, I think I should point to the sales of our Journal as my answer. I submit that this is a good practical test. People do not buy technical journals unless they are worth buying, and our Journal is not a cheap one. Remember that we are a young Institute, and from the beginning we have published two volumes each year averaging about 300 pages each. Remember, too, that each member of the Institute gets his or her Journal included in the subscription, that various libraries, universities and technical colleges receive presentation copies, and that we exchange with other journals. In the year 1910-11—our year dates from July 1—the sales amounted to £124. This was not quite two years after our foundation. In the next year they rose to £160, then to £216, and then to £225 in the succeeding years. In the year 1914-15, in which the war broke out, there was a drop to £182. The next year the sales amounted to £320. Last year they reached £415, and this year, which will not be completed until June 30, they are even higher than in any corresponding period to date.* You will see, therefore, that not only was there an increasing demand for the Journal before the war, but also that the metallurgical requirements of the latter and the numerous problems with which manufacturers and users of non-ferrous metals and alloys in this country and those of its Allies are now faced have evidently created a demand for the kind of knowledge which our Journal furnishes, and I beg you to note that this demand is still increasing. In other words—and if my interpretation is justified—it has been found that the Journal is able to supply information which has been of direct practical value in the national crisis, and I think, and certainly hope, that this will continue to be the case in the years which follow the establishment of peace, when economic competition in the world's markets is likely to be severe and will demand the highest technical efficiency of which we are capable. The demand for our Journal in the United States of America is especially noteworthy, and points a moral for us which I need not labor. It is all the more remarkable in that that country quickly followed our lead in establishing a corresponding Institute, known as the American Institute of Metals, which publishes its own Journal. As yet we are the only two countries who support a technical Institute devoted solely to the study of non-ferrous metals and alloys.

GROWTH OF MEMBERSHIP.

My next comment refers to our membership. The figures on December 31 of each year since our foundation in June, 1908, are as follows:

Year.	Total Membership.
1908	355
1909	505
1910	551
1911	586
1912	606
1913	626
1914	645
1915	640
1916	660
1917	888

You will notice that we started with what I may call an original membership of 355, and that in the two years succeeding 1908 we averaged a net annual increase of just about 100. In the next six years our total increase, however, was only 109, corresponding to an average annual increase of a paltry 18. In 1917, however, a net increase of no less than 228 new members took place. This striking augmentation of our number after a lengthy period of only gradual increase deserves our attention and examination. The comparatively rapid growth of the Institute in the first thirty months of our existence was highly gratifying, and was due to the energy, zeal and enthusiasm which animated those who launched the new enterprise. The labors which produced this result were, however, the work of individuals who canvassed vigorously each in their own way among their personal friends, and I may be allowed to refer to the successful efforts of Sir William White, Vice-Admiral Sir Henry Oram and Mr. J. T. Milton, which have as their result the fact that we number among our members a remarkable proportion of marine engineers and shipbuilders. The succeeding six lean years, however, demonstrated conclusively that, if a satisfactory net increase of membership was to be regained, something more systematic in the way of an effort, which should be directed by the Institute itself, must be prepared for and launched. It is the signal service of Mr. G. B. Brook of Sheffield to have shown, in the early months of last year, what could be done by the pertinacious canvassing of a particular district. I think it is probably the case that his position as inspector under the Ministry of Munitions gave him a certain power in this direction which would otherwise have been absent. Nevertheless, after making full allowance for this, it must be conceded, I think, that it was a remarkable result for himself and his co-workers to achieve that, at the March ballot for new members, just over one-half the total—45 out of 88—came from the Sheffield district in which they had worked. This result was just the demonstration the Council needed that, if only they set to work in the right way, other districts could be made to contribute increases, I do not say of the same magnitude, but at any rate of a like character. Accordingly, early in May, an "Increase of Membership" Committee was set up. This committee set to work without delay, and during the summer got in touch with our Birmingham friends who have for several years had a local section. They took the matter up vigorously, and with Mr. Evered as chairman and Mr. Bill-Gozzard as local secretary, a successful campaign was prosecuted which produced no less than 83 new members. These efforts concentrated in the Sheffield and Birmingham districts—both of them important centres of the non-ferrous metal industries—have produced more than half the great increase of membership which occurred in 1917. I am glad to say that similar movements have more recently still been organized, at the suggestion of the above committee, on the one hand in Glasgow and the west of Scotland, and on the other hand in Manchester and Southwest Lancashire, and we hope for considerable accessions of new members from these sources. In due course I hope that similar campaigns will be initiated in the Newcastle district, in the southwest (including Bristol and South Wales), and, though it is much our largest centre, in London itself. All of these will, I am convinced, give a good return to properly directed effort.

Anyone familiar with our Journal must have been struck with the fact that copper and its alloys figure much more frequently in our pages than any other metal, and this no doubt corresponds to a preponderance in the number of our members who are engaged either in manufacturing or using this metal and its alloys, and to the fact that these have always been the most important industrial non-ferrous materials.

*The sales in odd months of our present year already exceed those in the whole of last year.

But, as I have ventured to point out in a recent paper, the position of copper is being seriously challenged by aluminum and its alloys in many practical applications, while there are numerous other directions in which it is the only metal which can be used. Then there is nickel and its important industrial alloys, zinc and its various alloys, together with tin, lead, antimony and their alloys—all of them metals produced in comparatively large quantities. I may be quite mistaken, but I venture to doubt whether any of these metals is represented in our membership to an extent which corresponds to its practical importance. If this is the case we ought to take steps to remedy the deficiency, and if this is done I think it will come to have a beneficial effect both on the Institute as such and on ourselves in increasing our financial stability and broadening our knowledge of metals. My own view, taking everything into consideration, is that we ought to be able in due time to raise the membership of the Institute to at least 1,500, and to maintain it there. I am not going to prophesy, but I think it can and will be done.

My third point has to do with the work of the Corrosion Research Committee. As no doubt most of you are aware, the Council of the Institute, not quite two years after its foundation, set its hand to attempt the solution of one of the most pertinacious difficulties and perplexing problems that confronted then—and still confronts—the users of non-ferrous alloys, viz., the corrosion of brass marine condenser tubes by salt water. I think it is worth recalling this to you, because, so far as I know, no technical society has at so early a stage of its existence made itself responsible for, and in a sense staked its reputation upon, the solution of a problem of wide practical interest. But we had round the Council table the men who made the tubes and the men who used them—both equally anxious for success—and in addition laboratory workers who could advise as to the methods by which the problem should be attacked; and we decided that the attempt could and should be made. Our resources were slender. We started a fund and invited subscriptions. What is more, we got them. At least we got enough to enable us to begin the investigation. We set up a Corrosion Committee. Dr. Bengough agreed to act as our investigator and to give his services in his spare time. The University of Liverpool gave the laboratory accommodation and made us a grant of £50 per annum toward our costs. And the makers gave us the tubes. The only thing that had to be paid for was the small-scale condenser plant, and for this we had to accept the lowest tender. Truly, if ever an investigation was begun with an unlimited fund of energy and good will, the slenderest of financial resources, and all misgivings as to ultimate success kept resolutely in the background, this was.

What happened? Dr. Bengough agreed, in the first place, to prepare a resume of the literature on the corrosion of condenser tubes, which was already considerable. His main conclusion, embodied in the first report to the committee, was that none of the existing views on the subject could be regarded as in any way established, that the evidence was conflicting in every case, that nothing could be taken for granted, and that he must start at the very beginning. Undoubtedly the ideal way of tackling the problem would have been to investigate the corrosion of the pure metals concerned, viz., copper and zinc, in the first instance, and to endeavor to explain how and why corrosion starts at any given place in such metals. This is where our slender financial resources imposed on us a different policy, however, and a beginning was made on condenser tube alloy which, although it contains the two metals, is nevertheless theoretically a one-phase system, and it was hoped that this compromise would work. That only a partial success was achieved the events of the next four years proved; for, although in this period two reports were published, and contained much valuable information, neither of them went to the root of the matter, nor could they do so on account of the fact that a problem with too many variables had been attacked before determining the effect of each under appropriate conditions. That our work was by no means fruitless, however, is shown by a letter we received lately from an American firm, who tell us that they are specialists in condenser tube manufacture, and have had forty-five years' experience in the casting and working of brass. They say:

"It has been our good fortune to secure a copy of the second report to the Corrosion Committee of the Institute of Metals. This is not only most interesting, but also very instructive and complete. It has given the engineering world the best data and information on causes and prevention of failure in condenser tubes of anything that has been published up to the present time. To the men who made the investigation and compiled the report are due the heartiest congratulations of the world on their work. Through them the Institute of Metals has been brought closer to the manufacturer and the engineer, and by such work as this the Institute will gain the entire confidence of practical men of the world, who will look to them more and more for solutions of their troubles and problems."

In 1916 the work of the committee was, at the request of our council, aided by the Advisory Council for Scientific and Industrial Research, and a substantial financial grant from the Treasury made. In consequence of this we have been able to arrange for the research to be carried out under conditions much more nearly approaching the ideal. Since the summer of 1916 Drs. Bengough and Hudson have devoted their whole time to the investigation of the problem—and quite recently Miss Goodwin has been added to their staff.

A laboratory specially designed and equipped for the work has been installed in the metallurgical department of the Royal School of Mines, and as a result of a kind offer by Mr. Christie our experimental plant has been removed from Liverpool to the Southwick Power Station at Brighton, and is being run under strictly practical conditions. Most important of all, it has been possible for the committee to arrange that the problem should be attacked in the laboratory *ab initio* with pure metals corroding under the simplest conditions, and the sound fruits of this policy will, I think, be found to have ripened when the results of this investigation come to be published. Our investigators are engaged on the fundamental task of laying the foundations of a theory of corrosion which shall be in harmony with, and as far as possible explain, all the observed facts, and thus lead up to the practical solution. It has turned out to be a case of "the longest way round is the shortest way there."

It is the privilege of one who occupies such a position as has fallen to my lot in the last twelve years to endeavor to serve the needs of non-ferrous metallurgy in two main ways: (1) By the execution and publication of research work; (2) by the training of students destined to take up technical positions in metallurgical works. As regards the former, it is not my intention to say anything today other than that such work is, for the most part, essentially individualistic in its character. It is the expression of a man's personality in creative work of a particular kind. The function and application of such work is, I think, well understood in our Institute, and of this the Journal, if nothing else, is witness. The latter subject, however, receives very little attention on the whole, and in my opinion much less than its importance warrants.

I venture therefore to use this opportunuity of asking your attention to a few observations on it that I propose to make.

Non-ferrous metallurgy may be divided into two main parts which are quite distinct and well defined. One begins where the other ends. The first may be described as ore-treatment, and its field of operations is the extraction of metals from their ores. In other words, it is smelting. It may conveniently be regarded as having fulfilled its function when a marketable metal or alloy has been produced. With this side of metallurgy we, as an Institute, are not concerned. It is the province of our elder brother—or is it sister?—the Institution of Mining and Metallurgy. The second includes the working up of the raw merchantable products of the first by mechanical processes into a variety of finished materials, the founding of alloys, their mechanical and heat treatment, etc. On the whole, I do not think that there is any generally accepted designation for work of this somewhat composite character, the term metallurgical engineering seems to me to encompass it with sufficient accuracy. This is the province which we, as an Institute, have entered into and done our best to possess. We are, in fact, the youngest of the engineering societies. That we are recognized as an engineering society is testified by the invitation extended us to participate in the important Conference on Engineering Education, held at the Institution of Civil Engineers last October.

WRONG CONDITIONS CORRECTED BY EDUCATION

Paper Presented Before the Sixth Annual Convention of the American Electro-Platers' Society, Held at Detroit, Mich., July 1-3, 1918.

By Herbert J. Hawkins, Detroit, Mich.

Why will managers and owners of shops and factories spend their money freely for equipment and plating supplies, often using the services of electrical engineers to be certain that the generator and electrical equipment is correctly, efficiently, safely wired and installed, and this method is quite as it should be.

Then so far as competent help is concerned to operate and manage this department he often refuses to employ a qualified man and will employ some one unskilled in the platers' art?

Just recently I came in contact with the above situation; a small, complete plant for mechanical plating was installed and wired up, furnished with instrument board and instruments all in the most approved manner, yet instead of hiring a plater they proposed to have the fireman do the work because he had some leisure time.

Why will the same type of man when he desires to do something in the plating or cleaning line instead of hiring or advising with a man thoroughly familiar with this class of work, often entrust the work of installing such equipment to someone already in his employ because he saw similar work done in some other plant some years back, and in order to improve his own situation and standing with the boss he tackles the simple problem.

A short time ago I was asked to look over the installation of a cleaning equipment in a large gear plant and found the cleaner tanks for holding 500 gallons of the hot alkali all made from wood, 2-inch stock, lined on the inside with coaltar paint; tanks were fitted with steam pipes to heat the cleaner and they expected to use steel or iron anodes. The dynamo which was shunt wound of an obsolete type was a considerable distance from the cleaning tank, current being carried 40 to 50 feet; the generator was built to generate 600 amperes, whereas the work in hand would require from 1,000 to 1,500 amperes. I understand these wood tanks were discarded in less than 30 days, which was most natural as they would probably have gone to pieces in 60 to 90 days. This equipment, through ignorance of what was required for the work to be done and lack of understanding as to what and how to install has cost the firm more than it would to have hired a good man for a year; they will finally find it imperative to use proper tanks and equipment.

Operating plating and electro cleaning plants without being under the supervision of a competent plater means a great waste in chemicals and supplies besides usually lack of uniform and satisfactory production and unnecessary wear and tear on equipment.

While we are in the midst of the present conditions the best man that money can hire would probably be the cheapest in the long run when you take into consideration what such a man would save in chemicals, supplies, etc., besides an increased production of satisfactory work at a lower cost of production.

Why do some of our factory managers have the idea that if they send their platers to the A. E. S. meetings that their plater may give away some of their secret processes or methods which they are or think they are guarding from their competitors; while the fact may be and probably is that the competitor has used and discarded the supposed guarded method and passed along to some more "up to the minute method." Surely this would be so if he is fortunate enough to have in his employ a live member of the A. E. S. with all the educational backing back of them which these members have.

Yet there are such reasons and excuses given right in Detroit why certain platers are not encouraged to join us.

Why will this class of plants always bar from their plating plants, chemists, platers and salesmen? Guarding same as they would their "Sanctum Sanctorum" or the holy of holies. Usually such plants are laboring under a delusion that they have something new and original with them and is their very own. Possibly they have, but more often this type of plant is some years behind the procession and won't catch up until they wake up and change their old-fashioned methods, for whatever is suited to their particular line in the up-to-date practices of the day. One of the first steps to take with this object in view would be to employ the best A. E. S. member he could get, or insist upon his plater becoming a member, encourage him to take pride in his plant and his production; encourage him and finance him in equipping and operating his plant properly. Then have the latch string always out so far as visiting craftsmen are concerned, and there will be no occasion for secrecy and all branches of our industry and every member of the A. E. S. and those with whom they are associated will ever continue to grow and unfold, day by day, as we are able to grasp and assimilate the truths of our profession.

To correct this lack of interest or lethargy on the part of factory manager and superintendent as to what the A. E. S. is willing to do and is doing for their men, I would suggest an education or publicity drive, not at platers who should be and are not members, but at their employers who are just as interested in the finished product as the plater and sometimes more so.

ELEMENTS OF ELECTRO-CHEMISTRY

Some Instruction for the Plater Who Wishes to Understand the Theory of What He Daily Practices. Written for The Metal Industry by Joseph Haas, Jr.*—Second Paper.

Part II—Introductory Electro-Chemical Principles

1. Theory of Solution

Ordinarily platers say a substance dissolves or does not. But if they desire to gain an insight into chemical phenomena they should have an understanding of why certain substances as salt, sugar, magnesium sulphate, disappear when placed into water, while such substances as carbonate of copper, silver chloride, do not. The theory will be explained using water as a basis, though it is just as applicable to any pure solvent. The question as to why a certain amount of water will take up only a definite amount of substance must also be answered. Phenomena of solubility are best explained by the kinetic theory—a theory that considers matter in a state of vibration or motion.

All solid substances are held together by a property of matter called cohesion, which is a property by virtue of which all similar particles are held together. Now why substances like salts or sugar disappear when placed into water is explained by the kinetic theory as follows: The attraction of the water for the molecules is greater than their cohesion, so that the moment they are placed into water the molecules fall apart and are set in motion. That is, the molecules travel from the solid mass into the water, and in the water the vibration or motion is kept up. If the addition of solid substance is kept up, a point is reached where no more solid will disappear. The kinetic theory is explained by the fact that when the molecules entered the solution, they, in their movements hither and thither, collide with one another, and as more solid becomes dissolved the number of times the molecules collide increases and also the lengths of their journey will be less. As the molecules travel around, some come in contact with the solid and are retained by it. At first the number of molecules leaving the solid will by far exceed those returning to it. As more solid is dissolved the number of molecules returning to the solid increases; while the number leaving decreases until a point is reached where just as many leave the solid as return. Under such conditions no more solid disappears and the water is said to be saturated.

Why such substances as silver chloride, carbonate of copper, do not dissolve is explained that the cohesion of the molecules of those substances is greater than the attraction of the water, so that the water cannot break up the molecules. Hence they remain in solid form. Therefore the whole matter may be summed up as follows: There are some substances which, when placed in water, the water overcomes the cohesion of their molecules and those substances disappear, while in other substances the cohesion is too great for water to overcome, and those substances remain in their original form. Of the substances which dissolve in water, when the rate at which molecules re-enter the solid is equal to the rate at which they leave, no more solid will disappear.

A look into the characteristics of solutions reveals that solutions are transparent, that there are no suspended particles, nor does any solid settle out on standing. A solution may therefore be defined as a homogeneous mixture, every part of which is identically like another part. The liquid into which the solid disappears is called the solvent, while the disappearing substance is called the solute.

2. Properties of Solutions

The next question naturally arising is what effect, if any, have dissolved substances on solvents. Every liquid has a definite point at which it boils and freezes. Water being the main solvent of the plater; the following facts are known about it. Water freezes at 0 deg. C., and boils at 100 deg. C., and when certain substances are dissolved in it, it becomes a conductor of electricity, while certain other substances do not make it a conductor. The addition of substances that dissolve in water has revealed that the freezing point is lowered and the boiling point raised. The amount which a solute raises the boiling point or lowers the freezing point is a definite amount depending upon the nature of the solute and its amount. A molecular weight of sugar (342 grams), 60 grams area, 46 grams ethyl alcohol, each dissolved to make one liter (1,000 cc.) of water gives a solution which freezes at — 1.86 deg. C. This is called the molecular lowering of the freezing point. If 342 grams sugar, 60 grams urea are dissolved to make one liter of water, the boiling point is raised 0.52 deg. C. This is called the molecular raising of the boiling point. All substances that give a molecular lowering of freezing point — 186 deg. C. and a molecular raising of boiling point 0.52 deg. C., will not make water a conductor of electricity. Hence they are called non-electrolytes. The following table is one which is to be taken approximately; its variations and exceptions for practical realization will be explained later.

Salt	Freezing point depression	Boiling point raise
(1) $CuSO_4$	— 3.72° C.	1.04° C.
(2) $FeCl_2$	— 5.58° C.	1.56° C.
(3) $FeCl_3$	— 7.74° C.	2.08° C.

In each case a molecular weight is understood to be dissolved in water and made up to a liter. Why there should be these variations and discrepancies in the lowering of the freezing point, raising of the boiling point, and in conduction of electricity, led to a very important discovery in chemistry. Early in the nineteenth century there were some difficulties that chemists observed in pressures of gases. These were solved by making certain assumptions and then proving the assumptions. By analogy a Swedish chemist, Arrhenius, made the assumption that those substances which showed greater depression of freezing point of the solvent water than — 1.86 deg. C. and raising boiling point more than 0.52 deg. C. have their molecules break up, or fall apart, and that it was because of this falling apart that they conducted electricity. Likewise, each of these parts, called ions, exert an influence upon the solvent, as a single molecule would. Hence, any substance that gave two ions, when dissolved in water, lowered the freezing point twice as much as sugar, whose molecules do not fall apart. Likewise the boiling point increase is raised twice as high. Those substances that give three ions in solution lower freezing point three times as much, while the increase in boiling point raise is three times as great.

Investigation of the substances which, when dissolved in water conducted electricity, revealed that all metals, hydrogen and ammonium are given off at the negative pole or cathode. This led to the assumption that these substances, when in ionic state, carry positive electric charges. Those substances evolved at the positive pole or anode have negative charges.

*Mr. Haas is now a sergeant in the Overseas Surgical Instrument Repair Unit with the American Expeditionary Forces in France.

3. Theory of Electrolytic Dissociation

A sketch has been given of the results that led up to the electrolytic dissociation theory, or as it is sometimes called, the ionic theory. A more detailed explanation is now necessary. This theory states that when acids, bases, or salts (substances that exhibit abnormal freezing points and boiling points) are dissolved in water and renders the solvent a conductor of electricity, the current is carried by means of ions which are those parts into which the molecule of the solute separates upon entering solution. The ions carry definite electric charges proportional to their valence, and they conduct the current by movement under electric influence to the opposite charged electrodes. A solid substance like common salt—NaCl—when dissolved in water has its molecules break up into Na ions charged with positive electricity and Cl ions charged with negative electricity. The amount of the charges on both ions are equal in quantity, so that the solution remains electrically neutral. The result of ionization is expressed in equation form as follows:

$$NaCl = Na + Cl$$

Since it is because of the existence of ions that solutions conduct electricity it is readily seen that the more ions there are the greater the conductivity of the solution. It must not be assumed that when electrolytes are dissolved in water that the molecules are entirely dissociated. The amount of dissociation depends upon the nature of the electrolyte, the concentration, the temperature. Substances whose solutions conduct electricity freely are almost entirely dissociated, while substances whose solutions are feeble conductors are split up into ions only to a very small extent. Thus the degree of dissociation of a substance is measured by the conductivity of the solutions.

The following facts are known:

(1) All neutral soluble salts are highly dissociated.

(2) Acids: HCl, HBr, HI, HNO_3, $HClO_3$ are highly dissociated.

(3) Bases: NaOH, KOH are highly dissociated.

(4) Acids: H_3PO_4, H_2SO_3, $HC_2H_3O_2$ and NH_4OH, AgOH and $Mg(OH)_2$ are moderately dissociated.

(5) Acids: H_2CO_3, H_2S, HCN, $H_2SiO_2H_3BO_3$ and hydroxides of trivalent metals and some divalent metals are weakly dissociated.

4. Deficiencies of Table Given Under 2.

I have mentioned that the table of freezing point and boiling point was not true practically, although there is nothing wrong with the theory. If we assume 2,000 molecules of copper sulphate are to be dissolved in a liter of water, there would be 2,000 ions present if the 2,000 molecules ionized completely. But such is not the case. They only ionize a certain percentage. Therefore there are three factors that affect the boiling and freezing points—molecules of $CuSO_4$; Cu and SO_4 ions. Thus there will not be present 4,000 ions, but less; therefore the freezing point will not be lowered to — 3.72 deg. C., but some number a few tenths of a degree higher. Nor will the boiling point be raised quite 1.04 deg. C.

5. Electrolysis

Electrolysis is a process by which, with the aid of an electric current, an electrolyte may be separated into its positive and negative constituents, or as it is usually said into its metallic base, and its acid radical. The water of an aqueous solution is never decomposed, primarily, as long as there is a sufficient amount of electrolyte in the solution to carry the current, no matter how much stronger than water the electrolyte may be. The products of electrolysis appear only at the electrodes. The one to which all positively charged ions move or migrate being called the cathode, while the one to which all negatively charged ions migrate is called the anode. The ions moving toward cathode are called cations; those moving toward anode, anions. The products of electrolysis may be primary or secondary, the reactions being called primary and secondary. When primary, the electrolyte is decomposed into its main constituents which are given off at the electrodes as molecules, as the ions, when they touch the electrodes, have their charges neutralized and become ordinary atoms, which combine to form molecules. In secondary reactions the ions into which the electrolyte has dissociated move as in primary reactions to their respective electrodes, but may by reaching upon electrodes, or with electrolyte, give rise to the production or formation of other substances. During any electrolytic process the reactions may be primary, secondary, or a combination of the two. When individual solutions are taken up, such classification will be made.

6. Method of Ionization of Various Salts and Chemical Composition of Electrolytes

Experiment has determined that all acids, bases and salts are electrolytes. By examining these substances it has been revealed that they consist of a metal component (hydrogen and ammonium) which forms the positive ion (cation), and all the rest of the molecule form the acid compound or negative ion (anion).

Sodium carbonate, $Na_2CO_3 = 2\ Na + CO_3$.

Sodium chloride, $NaCl = Na + Cl$.

Sodium chlorate, $NaClO_3 = Na + ClO_3$.

Sodium cyanide, $NaCN = Na + CN$.

The question may arise as to how it was determined as to the manner in which all electrolytes dissociated. Such work was first applied by a chemist named Hittorf by making a close study of the migration of ions under electric influence. This he did by determining the composition of the components around the electrodes before electrolysis, and then after electrolysis determined the composition again. In this way he determined the ionization of very complex molecules. It has been accepted that the acids that platers use most often ionize as follows:

(1) $HCl = H + Cl$.

(2) $HNO_3 = H + NO_3$.

(3) $H_2SO_4 = H + HSO_4$.
$HSO_4 = H + SO_4$.

(4) $H_3BO_3 = H + H_2BO_3$.
$H_2BO_3 = H + HBO_3$.
$HBO_3 = H + BO_3$.

The ionization of plating solutions:

Acid copper, $CuSO_4 = Cu + SO_4$.

Cyanide copper, $KCu(CN)_2 = K + Cu(CN)_2$.

Silver solution, $KAg(CN)_2 = K + Ag(CN)_2$.

Nickel sulphate solution, $NiSO_4 = Ni + SO_4$.

Nickel ammonium solution,

$$(NH_4)_2\ Ni(SO_4)_2 = NH_4 + NH_4Ni(SO_4)_2$$
$$NH_4Ni(SO_4) = NH_4 + Ni(SO_4)_2$$
$$Ni(SO_4)_2 = NiSO_4 + SO_4$$
$$NiSO_4 = Ni + SO_4$$

Acid zinc solution, $ZnSO_4 = Zn + SO_4$.

Cyanide zinc solution,

$$K_2Zn(CN)_4 = 2K + Zn(CN)_4$$

(To be continued.)

A PIONEER BRASS PLANT

A Description of the Haydenville Company, of Haydenville, Mass., One of the Largest Establishments in the Country for the Manufacture of Plumbers' and Steam Brass Goods.

By a Staff Correspondent.

The plant of the Haydenville Brass Manufacturing Co. was one of the first established in the United States for the manufacture of plumbing, steam brass and iron goods. Previous to the time it was founded large quantities of this line of goods were imported into this country.

It was founded in 1845 by the late Lieutenant-Governor Joel Hayden, of Massachusetts, and the village derived its name from the founder and his brother, Josiah Hayden. Haydenville, Mass., is a thriving New England village and situated in a manufacturing center on the N. Y., N. H. & H. R. Railroad, Hampshire County, Massachusetts, outside the city of Northampton, and 25 miles from Springfield, the capital of the State.

PLANT OF THE HAYDENVILLE COMPANY AT HAYDENVILLE, MASS.

The story of American brass goods manufacture has no more fascinating or impressive chapter than that devoted to the discoveries and improvements resulting from the extraordinary inventive genius of the New England workman.

The genius for simplification of processes, the wonderful knack of devising tools and machinery for manufacturing brass goods, has enabled this concern in a small village to compete and hold the premier position in its line against firms located in the manufacturing cities. As in the past so in the present and the future. The Yankee knack which long since turned New England into a vast workshop is still at its age-long task, simplifying, improving, lowering cost of production, ever raising quality of product and keeping Haydenville brass goods one of the leaders at home and abroad.

The American people now recognize the value of goods by quality of material and appearance, workmanship, finish and fitness and frequently by something else, a trademark, a name representing in concrete form the character, quality and fitness of the maker, and when this is present it establishes the value of the goods more definitely than all else. Every piece of goods manufactured by the Haydenville Co. bears their registered trademark and are absolutely guaranteed and are so thoroughly known and accepted that they have become a standard of excellence everywhere.

Intelligent and skilled workmen, many who have been in the employ from twenty to thirty-five years, do much to give the goods manufactured the quality which has made them popular for nearly three-quarters of a century.

The entire plant was destroyed in the memorable Mill River Flood, 1874, caused by the bursting of one of the company's largest storage reservoirs situated a few miles north at the source of the stream. The reservoir flooded 125 acres, averaging 20 feet deep.

The works were soon after rebuilt on the old site and the present mills, foundries and water power plant are all of modern and substantial construction covering an area of 3 acres with ample shed and yard room and railroad side tracks.

The machines for finishing the goods are the company's special design and the brass lathes are equipped with a special spring chucking attachment for holding the pieces which no other concern in the country can use as it is covered by patents. The gripping power of this spring attachment is said to be far superior to air chucking or lever friction, therefore the machinery, tools and general equipment are of the best and everything about the plant arranged for the complete production of high grade brass and iron goods.

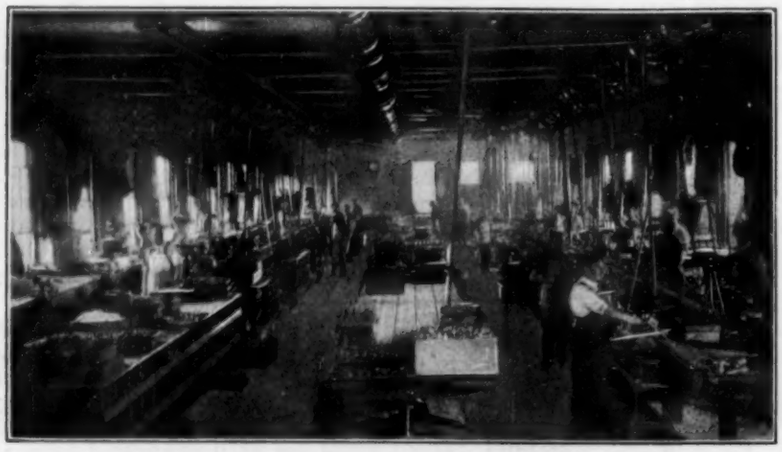
One of the main points that a visitor notices is the particular care that is maintained in manufacturing throughout the whole plant and the simplicity in handling the castings from one machine or department to another which is all done by trucks with two separate divisions in each truck. Also the method that is employed in handling the finished and semi-finished goods.

AN INTERIOR VIEW OF ONE OF THE DEPARTMENTS OF THE HAYDENVILLE COMPANY.

The polishing department is entirely separated from the buffing department, which is located on a different floor and it works admirably as it is the first instance I have ever seen of a buffing department located independently from the polishing department.

The reputation of Haydenville nickel plated sanitary

brass goods is well maintained by the great care and skill that is employed in the plating room, and it has been known for Haydenville nickel plated goods to be in constant use for twenty years in public toilet rooms of hotels and railroad departments and still maintain their white lustre. The company has been fortunate from earliest times in its selection of careful superintendents and foremen. Men who have been thorough mechanics and loyal and resourceful managers. Among these have been Thomas H. Ives, Frederick Lanehart, Sereno Kingsley, Jacob Hills, Peter J. Hussey, Samuel C. Wentworth and Augustus Luce, and no small part of the resulting success should be attributed to them.



A VIEW IN ONE OF THE HAYDENVILLE FACTORIES

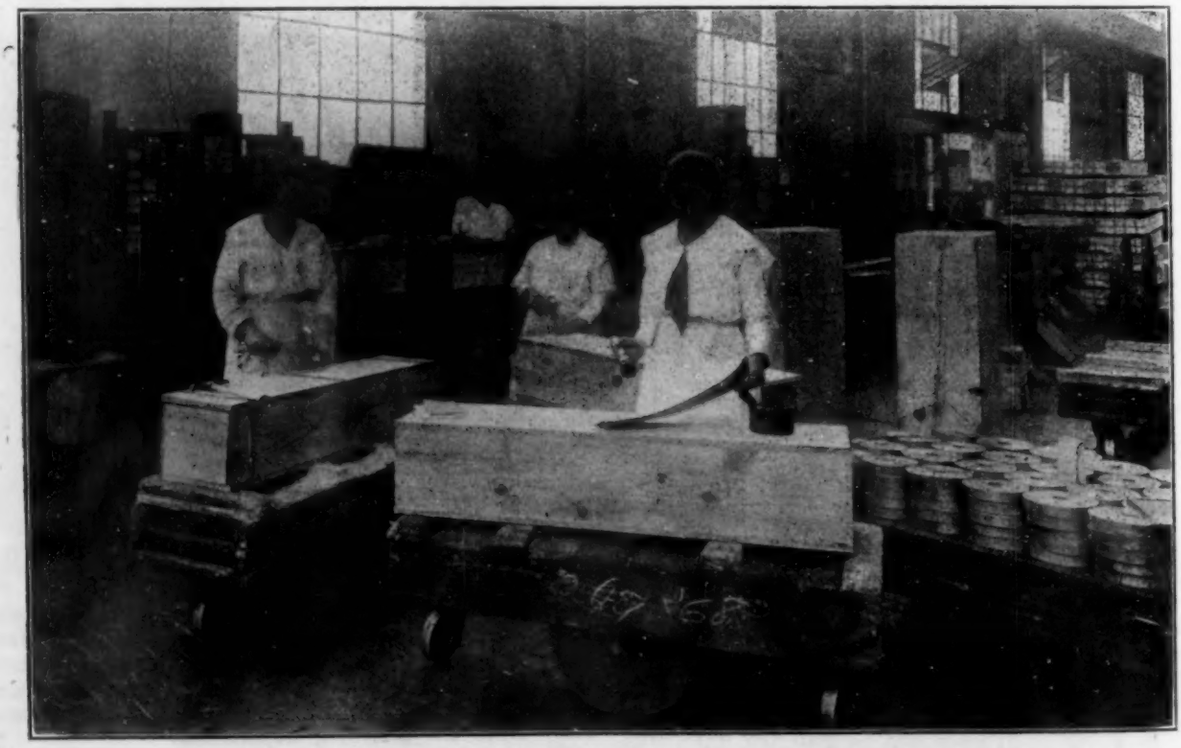
The present officers of the Haydenville company and the ones that have brought it up to its high state of efficiency and quality are C. J. Hills, president; Albert Sanders Hills, vice-president and treasurer; R. B. Hills, secretary and general manager. The company manufactures all varieties and sizes of faucets, valves, lavatory and bath connections, brass goods for gas and water companies and various specialties.

Among one of these is the "Puro" drinking fountain or bubbler which has been awarded the highest honors and gold medal by the health and sanitary congress of the world as the most sanitary drinking fountain on the market as it is impossible for the lips to touch the bubbler.

The company maintains a New York office at 150 Nassau St. (Printing House Square) from which local and export trade is handled, also maintaining offices in Chicago and San Francisco, Cal.

WOMEN PLAY THEIR PART IN WAR WORK.

This picture has been given to the Women's Committee of Waterbury, Conn., by the officials of the Chase Metal Works to show types of labor in which women are replacing men. The members of the registration committee hope by the presentation of these pictures through the papers to induce many women to enter the pictured occupations and release men for service or for more essential labor. There are thousands of positions in Waterbury factories and in those in hundreds of other cities throughout the United States open to women, and aside from the pecuniary benefits to the women they will have the satisfaction of knowing that they are rendering immeasurable service to their country.



WOMEN WAR WORKERS IN THE SHIPPING ROOM OF THE CHASE WAR METAL WORKS AT WATERVILLE, CONN.

BRASS WEAKNESS

A Microscopal Explanation.

Written for The Metal Industry by James Scott.

Brass has always been notorious for faults of an apparently inexplicable character, and these have become very conspicuous in cases where the alloy has been submitted to the influence of high temperatures from any source, such as friction. For this reason the utilitarian possibilities of the substance are comparatively restricted, being confined to the manufacture of fancy, or other simple goods, which are not likely to experience much mechanical stress or heat. An insight into the microscopical aspects of brass enables us to gather sufficient enlightenment respecting the course of events which

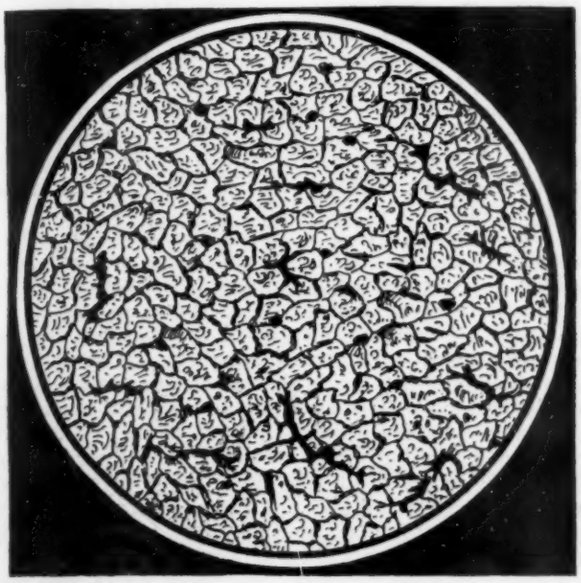


FIG. 1.—ABOUT ONE-THIRTIETH INCH OF THE SURFACE OF AN AEROPLANE BRASS NAIL HEAD IN THE NORMAL STATE, ETCHED WITH CHROMIC ACID. THE GRAINS ARE SMALL AND COMPACT. MAGNIFIED.

leads up to the weaknesses mentioned, even if some points still remain in partial obscurity. It needs not only isolated, but systematical, investigations into the subject to obtain the full measure of the transformations now dealt with.

Articles of spun and drawn brass are particulary liable, even when entirely free from actual work, to mysterious kinds of disintegration. These effects are really due to the previous strains through which the metal has passed, and the series of progressive re-crystallizations thereby commenced.

Cartridge cases have to be very carefully manipulated to prevent rupture during use, because of similar capacities. It is considered by competent observers that there are six or seven phases in the whole set of brass products, all of these being solid solutions. If any definite compounds *are* formed—and in the opinion of equally skillful metallurgists such is the case—they must be so minutely particled and uniformly distributed throughout the remainder of the mass that they practically become analogous to plain solid solutions. They are never pure, nor can they be isolated by ordinary means.

Broadly, the constitution of brass may be divided into three distinct grades, namely red, yellow, and white. In the first named the copper is predominant; while in the third the zinc occupies that position. The second includes the majority of the many varieties of brass, and may be regarded as comprising well balanced recipes, in which the union of copper and zinc is as beneficial as possible, the one ingredient suitably reacting with the other. But even so, limitations are imposed on the alloy in regard to application to service. The red stages consist entirely, or nearly so, of what are known as alpha crystals. These retain many of the qualities of the copper component, being soft and ductile. The yellow stages consist *mostly* of beta crystals, which are stronger, but not so ductile as the preceding. The white stages consist principally of gamma crysals, and are very brittle. These crystals have a silvery lustre.

One can however obtain, as it were, overlapping stages in which alpha crystals are yellow, and beta crystals red, the results depending on the action of certain proportions of the respective metals caused to undergo special processes. It is no use pretending that the underlying facts can be accounted for, they cannot.

Now, a common brass may be composed of all three

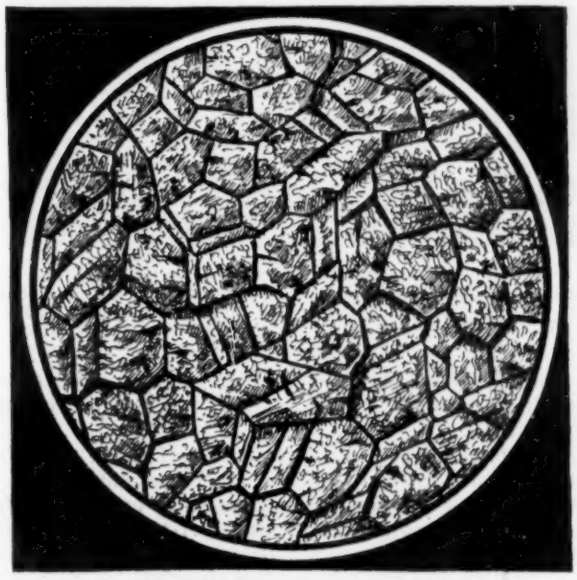


FIG. 2.—ABOUT ONE-THIRTIETH INCH OF THE SURFACE OF AN AEROPLANE BRASS NAIL HEAD AFTER DISTORTION BY HAMMERING, ETCHED WITH CHROMIC ACID. THE ORIGINAL GRAINS HAVE BEEN FORCED TOGETHER TO FORM LARGER ONES. MAGNIFIED.

conditions, the minute particles of alpha beta and gamma metal, i. e., red, yellow, and white—being so intimately mixed as to be undiscernible except by the most careful etching and kindred preparations. But the feature which most concerns us now is the facility with which internal changes occur.

Copper and zinc begin to separate out from the molten alloy at different temperatures, and owing to the vaporising tendencies of the zinc the routine of crystallization, during solidification of the mass, is seriously interfered with. The particles of zinc are naturally driven along the lines of least resistance.

It is customary to add a small percentage of some other metal, e. g., lead, tin, manganese, aluminum and iron to brass; but unless the selected element exceeds a definite amount the result is not sufficiently noticeable to deserve separate attention.

It partakes somewhat of the nature of zinc in its action except that no volatilization troubles are involved by its presence.

While the colors previously named are the inherent ones, they are subject to surrounding influences. For instance, yellow alpha crystals appear as the vicinity of 71 per cent of copper is approached, and the alloy is rapidly cooled; these getting arranged as a faint, delicate skeleton in a zinc-rich matrix.

When the copper content is from 64 per cent to 58 per cent, and the alloy is cooled to 470 degrees C., alpha crystals, with a *yellow* tinge are exuded from a matrix of *red* beta crystals.

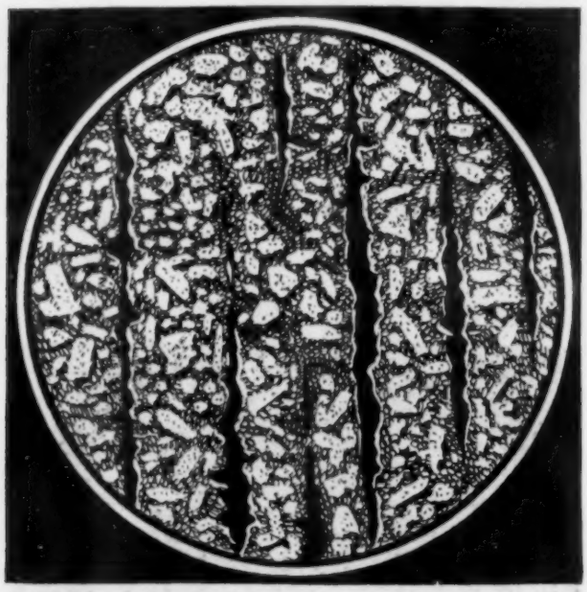


FIG. 3.—ABOUT ONE-THIRTIETH INCH OF A SURFACE OF AN AEROPLANE BRASS NAIL HEAD, ETCHED WITH CHROMIC ACID. THE LARGE GRAINS HAVE BEEN SPLIT UP IRREGULARLY, AND CREVICES HAVE APPEARED BETWEEN THEM. MAGNIFIED.

As a good example of these curious facts it must be stated that a brass containing from 71 per cent to 64 per cent of copper is, when just solidifying, made up of a mixture of alpha and beta crystals. After slow cooling, however, to 400 degrees C., or annealing at this temperature, the beta crystals become absorbed by the alpha crystals and the mass consists essentially of the latter. But further changes are possible according to the subsequent experiences of the metal. Beta crystals may be restored, and then again vanish, especially if increase of temperature accompanies physical actions.

It is because of these remarkable susceptibilities that alloys containing from the major proportions to 60 per cent copper can only be cold worked, while those for hot working have to be composed of 63 per cent to 50 per cent copper.

Commercial white brass is almost all of the gamma stage, there always being less than 45 per cent of copper present. It is referred to now in bulk because the brittleness developed in brass is undoubtedly occasioned by the formation of this stage on a small, scattered scale throughout an affected alloy.

Rapid cooling may suppress a certain state in brass, but this is capable of prominently reasserting itself at atmospherical temperatures, the reversion being accelerated should the metal be struck or vibrated either purposely or inadvertently. Suppose, for instance, that the original brass is slightly brittle and is treated to eliminate this trait. It does not follow that the meritorious condition will be permanent, since dropping the object made from it, shaking it, or otherwise distorting any portion of it will cause a brittle crystallization to supervene which will end by being similar to that existent at the beginning, and which it was considered had been altogether abolished. These results are traceable mainly to the habit of some of the ingredients, the one slowly growing, at the expense of the others, and awaiting a favorable opportunity to demonstrate its power.

The illustrations are founded on observations made on brass-headed nails used for attaching the fabric in aeroplane construction. This is, of course, an important, albeit apparently insignificant, application, for if the metal cracks it is likely to entail considerable danger. It is a quite common phenomenon for the heads of brass nails to fall away, and the most feasible explanation is that now described.

Before the structure of the metal can be satisfactorily ascertained it needs deep etching with chromic acid. By this means we learn that a new brass head has the formation shown in Fig. 1, the grains being small and homogeneous. When, however, the nails are driven home with forcible blows of a hammer, which *partly* flattens them, the grains partake of the shapes shown in Fig. 1.

Susbsequently these grains are capable of splitting up individually into smaller dimension, more so if subjected to heat, or extremes of atmospherical influence, or they may unite together if distorted, as shown in Fig. 2.

During the incidents mentioned the particles are momentarily fused or squeezed together, and after relief from the modifying action they re-form as much larger, angular grains. The straining consequent upon such changes loosens the grains, some of which, by concentrating or shrinking, leave crevices round their boundaries, while others gradually cleave crossways, allowing detached pieces to fall out. In this way minute fractures spread through the mass, and may lead to a total breakdown of the parts, as shown in Fig. 3.

A dozen or more different illustrations could have been given bearing on a single nail head, but I have selected the most typical portions for delineation.

ROYAL COPPER.

Royal copper is the formation of a semi-black oxide of copper upon metallic copper or copper plated surface. The blood red tone is produced afterwards by polishing the surface. The most successful method is as follows:

First, cleanse and polish the copper surface free from grease in the usual manner; second, plate in a solution of lead to obtain a very thin coating of lead to protect the copper from oxidization during the heat treatment. The lead solution should consist of the following:

Water	1 gallon
Caustic soda	4 ounces
Sugar of lead	1 ounce

Use the solution warm and with two to four volts. Plate the copper articles until a very thin coat of lead is produced; third, remove, wash and dry as usual; fourth, immerse in a molten solution of potassium or sodium nitrate heated in an iron crucible to 700 to 800 degrees Fahr. until a reddish black coating of oxide of copper is produced; fifth, cool in kerosene or paraffin oil; sixth, polish upon a soft buff, using gold rouge mixed with denatured alcohol as the polishing medium.

The lead deposit can be dispensed with if so desired, but concerns producing the royal copper finish have decided the method is the best as a more uniform surface free from imperfections is produced.—C. H. P.

EDITORIAL

Vol. 16 New York, July, 1918 No. 7

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW.
Published Monthly

Copyright 1918 by
THE METAL INDUSTRY PUBLISHING COMPANY
(Incorporated)

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE $1.00 PER YEAR, POSTPAID TO ANY PART OF THE WORLD. :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order : Cash Should Be Registered

ADVERTISING RATES ON APPLICATION
FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon - - - - - - - - - Editor and Publisher
Louis J. Krom - - - - - - - - - - - Managing Editor
George W. Cooper - - - - - - - - - Advertising Manager
Thomas A. Trumbour - - - - - - - - Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number Beekman 404 Cable Address, Metalustry

THE METAL INDUSTRY is a member of the Audit Bureau of Circulations

CONTENTS

	Page
American Electro-Platers' Convention	301
Economies in Use of Tin	307
The Deposition of Nickel Upon Cast Iron from a Hot Electrolyte	309
The Care of the Brass Furnace	310
Institute of Metals of Great Britain	311
Wrong Conditions Corrected by Education	314
Elements of Electro-Chemistry (Continued)	315
A Pioneer Brass Plant	317
Brass Weakness	319
Editorial:	
Season or Corrosion Cracking	321
British Institute of Metals	322
Correspondence and Discussion:	
Wood vs. Metal for Propellers	323
Naval Aviation Wide Open	323
New Books:	
Chemical Analysis of Iron	323
Tycos Mineral Oil Tables	323
Shop Problems	324
Patents	326
Equipment:	
New Enameling Plant	328
Continuous Bright Annealing Furnace	328
Improved Melting, Brazing and Soldering Processes	329
Sand Blast Machine	330
Stratton Air Separator	330
Winans' New Idea Vise	330
Association and Societies	331
Personals	334
Trade News	335
Metal Market Review	343
Metal Prices	345
Supply Prices	348

SEASON OR CORROSION CRACKING

The failure of wrought brass either under tension or at atmospheric pressure has long been a torment to the brass manufacturer. In fact the phenomenon had become so common as to be accepted almost as a matter of fact by brass mills and not much attention was paid to the probable causes. It was not until 1914 that the subject was forcibly brought to the notice of investigators: ALBERT D. FLYNN, deputy chief engineer of the New York Board of Water Supply in a paper on BRASS IN ENGINEERING CONSTRUCTION published in THE METAL INDUSTRY, December, 1914, fired the opening gun of the attack on "season cracking." Mr. Flynn described at some length in his paper the troubles of the Water Board with failure of manganese bronzes of various types used in the Catskill Water Supply System. Since the presentation of the subject by ENGINEER FLYNN, several investigations have been carried on by producers, consumers and the United States Bureau of Standards.

Perhaps the most satisfactory developments in these investigations were given at a session of the American Society of Testing Materials' Convention held at Atlantic City, N. J., June 25 to 28, 1918.

A number of prominent metallurgists and physicists presented papers on the subject and advanced their conclusions as to the causes contributory to season cracking of brass. It is interesting to note that the metal experts agree on the main cause of season cracking; that it is due to initial stress left in the metal during mechanical working. The puzzling feature of the trouble according to W. RUEBEN WEBSTER of the Bridgeport Brass Company, is the erractic nature of its occurrence. There seems to be no way of predicting whether a specific material will or will not exhibit the difficulty under any particular set of conditions. It has also been known that material that has been annealed or partially annealed is not subject to this trouble.

The methods proposed for the detection of season cracking give promise of producing good results. MR. WEBSTER used a test involving mercurous nitrate and concludes that while it may prove valuable for materials that might be expected to season crack it would prove to be too severe for a great variety of articles employed to satisfy daily needs and which do so without trouble due to season cracking.

MESSRS. MERICA and WOODWARD of the BUREAU OF STANDARDS in a technical paper recommend naming the trouble "corrosion cracking" as they declare that metal under initial stress exposed to atmospheric conditions will invariably rupture. They suggest coating the material suspected with an oil or other corrosion proof coating. They also believe:

* * * * * "That the mercury salt solution test, in whichever one of its forms proves to be the most satis-

factory, is a very desirable and indeed a necessary one in the testing and inspection of brasses. Is it a sufficient one to provide definitely against the acceptance of material likely to fail subsequently by corrosion cracking?

It is highly probable that this test will eliminate all material which is liable to season crack; its sufficiency in that sense may be regarded as being in the process of demonstration every day. The authors doubt quite seriously, however, whether it is a sufficient test in the same sense for rods, tubes, etc., which are to be subjected to tensile stress in service, such as construction members, bolts, etc. Assume that a rod of naval brass has been finished with a draw without springing and sent out to inspection with moderate initial stresses. If the value of the initial tensile stress in the surface layers is less than the critical value of 25,000 lb. per sq. in.—for example, 15,000 lb. per sq. in.—the rod will not fail in the mercury salt solution test. The rod is passed and is threaded and used as a bolt, a tensile stress of 15,000 lb. per sq. in. being applied to it. If the elastic limit of the material in the outer layers is at least 30,000 lb. per sq. in., that value will be the value of the resultant tensile stress in the outer layer, and as this is above the critical limit established the bolt is likely to crack.

The authors can cite a number of instances in which material, samples of which did not fail in the mercury salt solution test, did crack in service under the application of moderate service loads. The tensile stress at the surface of these articles was not alone sufficient to produce cracking, but when augmented by a moderate externally applied stress, failure occurred. Had there been no initial tensile stress present in the outer layer, failure would undoubtedly have been prevented."

"It would seem, therefore, that one should quite clearly distinguish the two cases in applying and interpreting the results of the mercury salt solution test; it may be relied upon in the one case in which the material is subsequently not further to be stressed in tension, but not necessarily in case it is to be so stressed. For the latter case a direct measurement of the initial stress, if possible, is to be recommended, the result to be used in conjunction with the knowledge of the service stress which the article will be called upon to support. The sum of the surface layer initial stress and the externally applied stress should not be in excess of a certain value, which for 60—40 brass could be taken as approximately 15,000 lb. per sq. in. (tension).

As an alternative, to circumvent the difficulty of with the specimen under the tensile load (plus some face, the mercury salt solution test might be carried out measuring the value of the initial stress just at the surmarginal excess for safetv) for which it was designed in service.

Of late the problem of testing is somewhat simplified, for round bars at least, by the fact that good manufacturing practice insists upon finishing drawn rods in a straightening machine, which as is shown below may introduce a compressive stress in place of the original tensile stress at the surface. An initial stress measurement then only needs to show whether the outer layer is in compression or in tension in order to indicate whether straightening or springing has been properly accomplished. As shown above, such a test may be readily made by the use of a strain gage when machining a tension test specimen."

ELIMINATION OF METAL STRESS.

MESSRS. MERICA and WOODWARD state also in their paper:

"In eliminating initial stress in brass two general methods are available. First, the stresses may be removed or reduced to a safe value by annealing at a proper temperature; and second, the stresses may be removed mechanically by some process which introduces a stress at the surface of opposite sign to that already present."

The paper also contains an explanation of the origin of initial stress, its measurement and a full description of the methods proposed for the elimination.

W. B. PRICE, of the Scovill Manufacturing Company, presented a paper in which he relates his experiments for eliminating initial stress by means of heat treatment proposed by Professor E. Heyn in 1914. Mr. Price's results corroborates the conclusions arrived at by MERICA and WOODWARD. He states in reference to the heat treatment of four lots of finished 75 mm. cases, which had cracked at the mouth and base when subjected to the Government test of immersion for a period of four hours in a 1.5 per cent. solution of mercury bichloride:

"It is very evident that the heat treatment has apparently not affected the actual physical properties of these cases, as measured by the ordinary testing machine. A temperature as low as 500° F. is not sufficient to affect recrystallization on the greater portion of the shell as manufactured here. Nevertheless, heat treating has certainly diminished the degree of internal strains. Not one of the twelve cases which were tested from each of the four lots, as heat-treated, failed in the mercuric-chloride test. Furthermore, it is certain that the heat treatment has left the cases in a condition to resist corrosion or season cracking on the ballistic test and on long standing. In fact, it is very probable that this heat treatment has even increased the tensile strength several thousand pounds per square inch."

So from this data it would seem that brass manufacturers have a definite course to follow leading to the elimination of initial stress and thus remove the distrust beginning to be entertained by constructing engineers concerning brasses and bronzes for large engineering enterprises.

BRITISH INSTITUTE OF METALS

There is published in this issue of THE METAL INDUSTRY a portion of the presidential address of Prof. H. C. H. CARPENTER of the British Institute of Metals at the last general meeting. Reading this most interesting and illuminating speech recalls to mind the passing of the AMERICAN INSTITUTE OF METALS into the fold of THE AMERICAN INSTITUTE OF MINING ENGINEERS. One is impelled to draw involuntarily a few comparisons between the two societies:

Formed about the same time ten years ago with the same avowed object, the improvement and enlightenment of the metal industry, one, the British, has flourished from a small beginning of barely a dozen into a valuable and important INSTITUTE of nearly a thousand members. The other, the American, started with practically the same prospects but with a much larger field, the whole of the United States and Canada compared with England and Wales, has after ten years attained a membership of barely three hundred and has now passed out of existence, and become a section of a larger society. We wonder why?

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

WOOD VS. METAL FOR PROPELLERS

To the Editor of THE METAL INDUSTRY:

The editorial under the above title in the June issue of THE METAL INDUSTRY will serve a splendid purpose if it evokes a discussion from authoritative sources that will settle, for the duration of this war at least, the question of the relative merits of the various materials now being tried out in the manufacture of airplane propellers.

In my humble opinion there is no substitute now known that will replace wood and stand up to the work, providing the proper woods are used and the design of the propeller is such that its strength is distributed correctly. As aluminum weighs just three times as much as the woods that should be used in making propellers, it follows that one of equal bulk would be too heavy to operate successfully.

Again, cast aluminum is too uncertain a metal to place any dependence upon and I would hate to think of any of our boys or those of the Allies trusting their lives to a material so unreliable, that is, when used in propeller construction, though I am willing to admit that aluminum has its uses for cooking utensils and the like.

A sheet steel propeller covered with vulcanized rubber is a bigger joke than the aluminum brand. While the rubber is light in weight, its specific gravity is close to unity, its tensile serength is low and so is its transverse, and while the sheet steel may be strong it does not help it any to be covered with vulcanized rubber, as both together the weight is about double that of wood. Wrought steel or aluminum blades inserted into a cast hub made of aluminum have failed and will always fail for two reasons: First, because of their inability to withstand the enormous centrifugal force developed by the high peripheral speed, and, second, their utter failure to withstand the torsional strains to which they are subjected while striving to pull or push the airplane through space.

So there is nothing left but wood from which to make propellers and the selection of the proper woods and their treatment has been solved very successfully by many of our airplane manufacturers. I believe that the very best wooden airplane propeller has yet to be made and in offering the following suggestions it must be borne in mind that they are made in the spirit that should dominate us all just now and that is "Our Country, First, Last and All the Time" and not through any conceited notion that any one of us is the sole custodian of all the knowledge bearing on this most interesting subject.

Suppose we take the tip handed out by the very nation we are going to wipe off the map. If you have read the specifications of the German Army Board in years gone by, it will be understood that they were very particular as to the kind of wood used in the making of their intrenching tools, such as shovel, pick hammer and axe handles. They were also very fussy as to the woods to be used in the spokes and felloes of their gun carriage wheels and they were not a bit backward in naming second growth American white hickory and allowed no substitutes.

Now I do not wish to hand the "Huns" any bouquets, but we must admit that in anything they ever tackle, efficiency or "Kultur" is the watchword and thoroughness is their middle name. Don't you suppose that they had tried every other known wood before selecting our hickory and found that it was the only wood that would answer their purpose.

Conceding then that our second growth white hickory is all that it should be, we must look around to find for it a mate of about the same specific gravity, so that the laminations, or segments will be about an equal weight and of the same porosity to insure a better surface for gluing, and we pick out Mexican mahogany as being straight grained and after that there is nothing to it but to "go to it" and make the propeller.

There is this precaution to observe, however, and that is if you want a "real wheel" the planks both of hickory and mahogany from which the segments or laminations are made should be split from the log both ways and not sawed, as any defect in the grain can be detected instantly in this manner. I admit that this method is a frightfully wasteful one, but a wheel made this way will stand up to any strain that the Liberty motor is capable of placing on it and will put it all over any propeller made of any other material. Though it must be admitted that the combination of black walnut and mahogany makes a good wheel, but not with an oak center as mentioned in the editorial in the June issue.

Books could be written on this subject, but if this will start the discussion you can publish the book and rake in all the debts incidental to the publication of technical books.

W. H. PARRY.

Superintendent, National Meter Company,
Brooklyn, N. Y., June 20, 1918.

NAVAL AVIATION WIDE OPEN

TO THE EDITOR OF THE METAL INDUSTRY:

It is requested that you will publish the following notice where it will do the most good.—Navy Recruiting Bureau.

Here's a chance to enroll in the United States Naval Reserve Force and work at your own trade.

The naval aviation section needs a great number of men immediately. Good ratings and good pay are possible for qualified men. Here is the list of ratings and the necessary trades.

Machinists' Mates—General machinists, automobile mechanics and assemblers, toolmakers, diemakers and similar mechanical trades.

Quartermasters—Cutters and cloth fitters, upholsterers, canvas workers, painters, tent riggers.

Carpenter's Mates—Woodworkers of all kinds.

Blacksmiths—Toolsmiths, forge men, furnace men, etc.

Coppersmiths.

Shipfitters and all kinds of sheet metal workers.

Applicants must be American citizens from 18 to 35 years of age. Draft registrants will be accepted upon presentation of a letter from their local boards.

Men of the foregoing trades will be sent to school for special training. Applicants may enroll at 51 Chambers Street, New York, or at any Naval Recruiting Station in the United States.

There you are. Now sign up and help the Navy airboats get the U-boats.

NEW BOOKS

Chemical Analysis of Iron.—Eighth Edition. By Andrew Alexander Blair. 6½ x 9 inches. 318 pages including index. 102 illustrations. Bound in boards. Published by J. B. Lippincott Company. Price $5.00. For sale by The Metal Industry.

This book is the Eighth Edition of a work, which for thirty years no testing laboratory has been complete without. Since the last edition of this work there have been so many improvements in the methods for the determination of the usual elements in metal alloys and the so-called alloy metals have become so important that it was found necessary to recast the work and rewrite the greater part of it. Various methods employed in the analysis of alloy steels have been placed together and a separate part has been arranged for the alloy metals. The table of atomic weights has been corrected to correspond with the values recommended by the Committee for 1918, and the table of factors corrected to correspond with the new values.

Tycos Mineral Oil Tables.—Compiled and edited by E. N. Hurlbert. 4½ x 6 inches. 204 pages including index. Numerous illustrations. Bound in cloth. Published by the Taylor Instrument Companies. Price $1.00. For sale by The Metal Industry.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating-Chemical

ANNEALING

Q.—We are ordering nickel silver (ten per cent.), soft for spinning, and the stock is apparently soft in the sheet, but when it passes through the draw die, and we attempt to anneal same, we get the result of the dish cracking. We are using a Stewart furnace, natural gas and the temperature of the furnace was 1,050 to 1,100 Fahr. We also notice that the dishes will crack before they have been in the furnace one minute.

We have mauled the sides to set the metal, without results. The blanks for some are used right from the sheet. We have tried a charcoal fire, but get the same results. We would like to have you inform us what is the proper temperature to anneal nickel silver; also how long it must remain in the furnace.

A.—We believe that the temperature for annealing nickel silver that you have been using is too high and that you have been attempting to perform the annealing operation too quickly.

The proper temperature for annealing this class of material in the shape that it is in should not be over 800 to 900 degrees Fahr. Also, it would be better to heat the shell up gradually and hold at the final temperature for a few minutes and then allow the shell to cool in the open air, care being taken to avoid any draft striking the hot metal. The time of annealing for such material should be from a half to one hour; the heating, as stated above, to be done gradually.

The draw is not at all excessive, and if the metal was rolled soft before you started to use it, there is no reason why you should not be able to anneal the shells successfully.—K. Problem 2,591.

BURNISHING

Q.—We are confronted with the problem of burnishing large spoons, such as are commonly used for culinary purposes, before and after nickel plating. Difficulty has been experienced in causing the nickel to adhere to the steel spoons, particularly at the edges of the spoons. Frequently, the spoons which have been burnished after nickel plating have peeled or crumbled from the surface.

What can you suggest to overcome this difficulty so that the nickel will adhere to the spoons and at the same time will burnish very satisfactorily?

A.—There are several reasons for the peeling of the nickel deposit on the edge of the spoons. The voltage may be too high, the conductivity of the solution poor, the solution too alkaline or low in metal, or the articles are not properly cleaned.

However, in our opinion the trouble is due to conductivity and alkalinity, and we would suggest that the addition of 1 ounce of ammonium chloride and ⅛ ounce of sulphuric acid per gallon of solution be made, and then follow this addition with 1 to 2 ounces of single nickel salts per gallon in a day or so if the peeling still continues.

Also look into the cleaning operation and the final acid dip before plating should consist of 1 part of hydrofluoric acid and 15 to 20 parts of water. The use of this acid dip has been found to overcome peeling of the deposit many times.—C. H. P. Problem 2,592.

CASTING

Q.—We wish to cast 5/16 inch square soft steel shanks into brass handles which have a neck ¾ inch in diameter. Can you give us any recent improved formula for treating these shanks or chills so that they will be absolutely tight in the handles after they are cast in and not liable to work loose under long continued use?

A.—The portion of the steel shank around which the brass is to be cast, is preferably tinned. It is best to then coat it with a solution of ordinary rosin dissolved in alcohol as this prevents any corrosion of the tin coating and insures a clean surface for the brass.

Manganese bronze is an excellent alloy for making handles in question. Because of its high shrinkage, manganese bronze will shrink very tightly on the steel shank. It also takes a very high polish.

If enough metal is flowed over the steel so that the bronze is burned on to it, the handle can never work loose.

You might also try drop forging brass handles. By threading the steel shank and screwing it into the tapped brass handle and then oxy-acetylene welding the same on the copper side a very good job can be done.—J. L. J. Problem 2,593.

Q.—Would you kindly let me know what to use for back plate for running antimonial lead castings? I am using strawboard, but it seems to take too much impression.

A.—Ordinary card board, 3/16 to 5/16 of an inch thick, will give good results as a back. Asbestos can be used, but it is rather expensive at the present time and it does not hold the heat as well as the card board, hence being likely to chill the metal. As card board contains a considerable percentage of moisture, it should be smoked with a lamp before using. This will expel most of the moisture and the castings will run better and have sharper outlines.—J. L. J. Problem 2,594.

CORRODING

Q.—Can aluminum be treated so as to prevent against oxidation or corrosion from perspiration?

A.—In order to protect aluminum against corrosion or oxidation, we would advise that the most satisfactory coating would be a thin one of Bakelite. Bakelite is unacted upon by acids, alkalies or the chlorides that emanate from perspiration. This material requires about 300 degrees Fahr. to dry it. Celluloid lacquers may also be used, but a special one, however, is required for aluminum, and we would suggest that you get in touch with concerns manufacturing such lacquers.—C. H. P. Problem 2,595.

FINISHING

Q.—We are at the present time manufacturing a small watch case. The inside measurements of the back cover are only ¾ of an inch. We wish that you would tell us, if possible, what you consider the best means of finishing the same.

A.—The most satisfactory method of finishing the small watch case covers, ¾ inch in diameter, would be to lathe burnish them. An experienced lathe burnisher could produce a very high burnished finish at a low cost and which would be more satisfactory than any other method.

Such men can be found working in the button industry of this country.

The chucks for holding the articles are usually made up from hard wood, sometimes lined with canton flannel. The lathes are run at a high rate of speed, about 6 to 10 revolutions per minute.

An experienced man could burnish the covers for $1 per M.—C. H. P. Problem 2,596.

DIPPING

Q.—Is it possible to dip nickel silver without giving off objectional fumes? If so would appreciate it if you would kindly give me a formula for doing so.

A.—A number of mills are using a pickle of sulphuric acid, using about a quart of sodium bichromate solution to every hundred gallons of sulphuric acid and water pickle. We would also suggest that you might use four ounces of phosphoric acid per

gallon of ordinary sulphuric acid pickle, but, of course, if you use any nitric acid you will have to perform the pickling operation under a hood as fumes are bound to be given off.—K. Problem 2,597.

MELTING

Q.—Will you kindly give information on melting manganese bronze in the open flame oil furnace? We have built a new foundry and have no crucible furnaces. We do not succeed as well with the open flame as we did with the crucible furnaces. Can you give us information on the mode of molding and the best formula to use in making good, sound, blast furnace tuyers?

A.—No especial directions are necessary and no especial skill is required in melting manganese bronze ingots in the open oil furnaces. The furnace should be hot when the ingot is charged so as to accelerate the melting and avoid a high melting loss. It is desirable to set aside a furnace for this alloy alone, as accidental mixing with other alloys is pretty certain to ruin it. The oil pressure should be about 90 pounds and the air pressure 20 ounces. Recently very satisfactory melting has been obtained by a system that employs 275 pounds of oil pressure and 2 ounces of air pressure. Perfect atomizing of the oil, economy of oil and the absence of noise are claimed for this method of melting.

In the making of ingot manganese bronze in the open flame oil furnace, the copper is melted first and very hot. After adding the hardening alloy and stirring well, the temperature can be lowered by adding some manganese bronze scrap before adding the zinc. Unless this is done the volatilization loss of zinc is quite high. Care should be taken to see that the oil burners do not become clogged and that the oil is free from water and not too light or heavy. If too light, double the usual amount may be needed, and if too heavy, water is held in suspension unless the oil is heated.

In making blast furnace tuyers, etc., the sand should be worked as dry as possible and lightly rammed to avoid cracking of the castings. The cores should be friable for similar reasons. Various mixtures have been used, but the best formula is B. E. R. copper, 250 pounds; 10 per cent. silicon copper, 10 ounces. The more nearly pure the copper castings, the better their thermal conductivity, this following the electrical conductivity very closely. If you will analyse the tuyers that have the best reputation you will find that they contain 99.5 per cent. of copper or higher. —J. L. J. Problem 2,598.

MIXING

Q.—We are wondering if you know of any formulas for white metal castings besides the regular antimonial lead of 13 to 18 formulas. We would like to get a mixture that is harder and at the same time to be used as the above; that is, in slush castings in bronze molds. Do you know of anything that can be added or mixed so as to make it harder, without destroying the running quality? We use mixtures with 10 to 50 per cent. tin on some goods, but the low per cent. of tin does not answer any better than the regular antimonial lead, and the higher per cent. of tin makes the metal too costly for our purposes.

A.—Several new alloys have been brought out recently that are worthy of a trial in novelty work. One of these is the so-called "Ulco" metal. This is a lead base metal hardened by calcium and barium. It can be given a Brinell hardness of 28.0 and is quite fluid when molten. Its obvious defect is the readiness with which it oxidizes or drosses. This has been overcome to a sufficient extent by the use of a die-casting method to enable the alloy to be used for automobile bearings. Some similar process or perhaps unusual care in melting might enable it to be used for novelty work.

Another alloy that is attracting much attention is one composed of lead 90 per cent. and cadmium 10 per cent. Its use as a solder has been advocated, but the readiness with which it oxidizes and the fact that it can hardly be looked upon as non-poisonous are limiting factors in its application as a solder. The use of a chloride of zinc flux reduces the amount of dross and careful melting will further aid in correcting this defect of the alloy. Experimenting with various percentages of lead and cadmium may result in your finding an alloy suitable for novelty work.—K. Problem 2,599.

PLATING

Q.—When the plate obtained from brass solutions turns red, does this condition necessarily indicate an excess of copper? Does not the same condition exist in plating as in the brass foundry, viz.: that a slight excess of zinc will also produce a red color?

A.—It is entirely possible that a red color shown in a brass plating solution is due to too much zinc as well as to an excess of copper. This may be proved by making a test with some of the solution and adding a little more copper salts and vica versa. —C. H. P. Problem 2,600.

REFINING

Q.—Can you inform me how to refine about two ounces of fine gold which has been dissolved in about sixteen ounces of aqua regia? I precipitated the material some time ago with ammonia, but it exploded.

A.—The reason that you had explosive results in attempting to reclaim the gold from your aqua regia was because you did not eliminate the strong acid present. If this was not the case, then probably you dried the precipitate which you obtain when you added the ammonia to the aqua regia solution, and this dried precipitate is fulminate of gold which is very explosive in this form. In order to be safe you should keep the gold hydrate moist or dissolve it in cyanide of potassium, in which form it may be used to make up a new gold plating solution.

If you want to recover the gold as gold from the aqua regia solution you should proceed as follows: Evaporate the acid solution carefully until it is perfectly dry, and then when cold add water until you have a volume of about a pint. Then add ferrous sulphate in the form of a strong solution, and then filter off the resulting precipitate of gold. This gold, after being washed well on the filter paper, is then heated in a porcelain crucible until it assumes a yellow color. Or it may be melted in a small graphite crucible, if you have enough of it, by mixing it with powdered charcoal and carbonate of soda.—K. Problem 2,601.

SOLDERING

Q.—We would like information relative to the soldering of cast iron (scored cylinder walls), either by the mercury chloride process or by the use of electricity and chemicals.

A.—Soft soldering cast iron can readily be accomplished in the following manner: 1. Clean the parts to be soldered by brushing with a steel-wire brush, or scrape or file them, as the surface must be bright and free from rust or oxidization. 2. In 8 ounces of boiling water add all the copper sulphate the water will dissolve, allow to cool then add ¼ ounce of sulphuric acid, and bottle for use. 3. With a small pencil-brush apply a little of the solution to the clean cast iron and a deposit of copper will be produced immediately. Wipe off the excess of the solution. 4. Prepare a soldering flux consisting of 4 ounces of chloride of zinc solution, 1 ounce of sal ammoniac and ½ ounce of chloride of tin. Mix thoroughly and apply a little to the coppered part to be soldered. Then heat the parts to be soldered to the melting point of the solder, but avoid using the flame on the point to be soldered.

5. Apply a little more flux to the surface and run in the solder. The soft solder should consist of 50 per cent. of lead and 50 per cent. of tin, or 60 of tin and 40 of lead.

In hard soldering the same methods of cleaning should be followed. As a flux use water glass, then prepare the solder from either silver solder in finely divided form or brass solder (54 parts of copper and 46 parts of zinc). Mix the pulverized silver or brass solder with fused borax powder to a paste with sodium silicate. Apply to the parts to be soldered and heat the cast iron to the melting point of the solder.

A piece of steel wire bent at the end and flattened will be required to work the hard solder into the joints; when melted, a little of the dry borax is sometimes required during the soldering operations to assist in the fluxing of the solder.—C. H. P. Problem 2,602.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

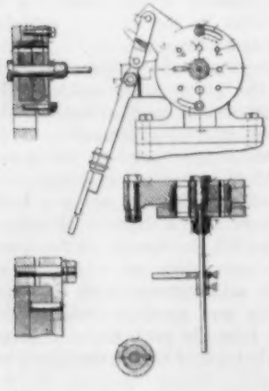
1,263,959. April 23, 1918. **Anode.** Henry R. Swartley, Jr., of Manhasset, New York, assignor to Davis-Bournonville Company, of Jersey City, New Jersey, A corporation of New York.

The invention is an improved anode for water electrolyzers. It is customary to make these electrodes of iron, and in order to protect them from oxidation by the oxygen liberated at their surfaces the general practice is to plate them with nickel. Instead of the electro-deposited surfaces, it is proposed to provide these anodes with sprayed metal surfaces, that is to say, coatings composed of fine nickel particles rendered molten and impacted on the iron by means of a blast. Metal coatings of this nature are known, but have not heretofore beenapplied to anodes, for which such a coating possesses a peculiar advantage. This advantage is the special rough or uneven surface, due to the character of the coating, the structure of which is necessarily different from one formed electrolytically, the effect of such surface being to promote the liberation of the oxygen. It will be understood that the shape of the anode, or whether the electrode is une-polar or bi-polar, is not material.

The drawing shows an illustrative form of electrode and indicate the sprayed nickel surface.

1,265,345. May 7, 1918. **Metal-Cutting Machine.** John La Rock, of Chicago, Ill.

This invention relates to a novel metal shearing machine for shearing round, square and flat metal stock and the invention consists in the combination and arrangement of the parts shown in the cut.



Among the objects of the invention is to provide a shearing machine in which the stock is cut or sheared between the flat parallel faces of shearing elements, with means whereby said elements are held and maintained in absolute parallelism, and are prevented from separating under the shearing stress of the cutting operation, so as to produce straight, clean cuts of the stock.

Another object of the invention is to provide a machine of this character in which the parts are so constructed and combined as to produce an exceedingly strong and durable machine, and one in which the wear of the parts, due to the movement of one part on the other, may be readily taken up and the shearing or cutting elements maintained in accurate cutting or shearing relation.

1,265,150. May 7, 1918. **Process of Producing Phosphor-Copper Compounds.** Hyleman Alison Webster, of Columbia, Tennessee, assignor to John Jefferson Gray, Jr., of Rockdale, Tennessee.

This invention relates to a continuous process of producing compositions, or compounds of copper and phosphorus, and has for its object to provide a method which will attain these results when using a basic phosphate as a source of phosphorus in a more efficient and less costly manner than has been heretofore proposed.

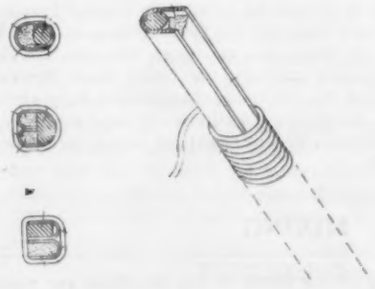
According to this invention, the inventor produces compositions containing copper and phosphorus such as copper phosphids, in a blast furnace, in an electric furnace, or in any other suitable furnace by smelting a charge of the character mentioned below. That is to say, selecting a blast furnace as an example only, he may employ a charge consisting substantially of:—silica SiO_2 1.1 parts to one part CaO. Phosphorus ascertained by calculation based on the percentage of tricalcium phosphate in the phosphate rock, 1 part to 2 parts of copper; coke in excess, say 1 part to 2 parts of the charge. More specifically stated, a blast furnace charge may be made up as follows:

	Pounds
Tricalcium phosphate rock	4,000
Quartz	2,120
Copper	1,200
Coke	3,600

In case an electric furnace is used that portion of the carbon employed in a blast furnace for the purpose of generating heat and maintaining the temperature alone, will not be needed, for this said heat will be furnished by the current.

1,265,453. May 7, 1918. **Metal Electrode Used in Electric-Arc Deposition of Metals.** E. H. Jones, Canonbury, London, England.

This invention has for its object an improved method of forming or making metal electrodes used in electric arc soldering and deposition of metals.

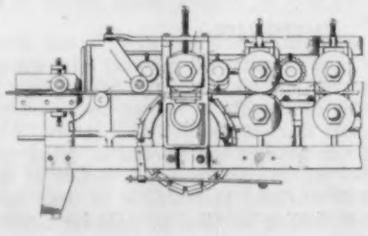


According to this invention, as applied for depositing "high speed steel" the electrode is constructed of a mild steel or cast iron channel section case or cases in which or in one of which is secured a cast iron or carbon rod or other suitable carbon content such as charcoal or ferrochrome, while the compounded materials to form the "high speed" alloy is placed in the case or cases preferably (but not necessarily) in the form of a paste which may be extruded as shown in cut, and allowed to set previous to placing same in the case.

The "high speed" alloy comprises any suitable proportion for example of vanadium, cobalt, tungsten, molybdenum, chromium, with or without aluminum, which may be mixed with a suitable binding agent such as silicate of soda.

1,266,470. May 14, 1918. **Machine for Forming Tubes.** J. L. Hosack, Woodstock, Ontario, Canada. Assignor to Standard Tube and Fence Company, of the same place.

This invention relates to improvements in machines for forming tubes of the type in which tubes are formed from strips of metal passed longitudinally through a plurality of forming rolls and dies, to give them their final shape and the objects of the invention are to enable the forming operation to be more effectually performed.



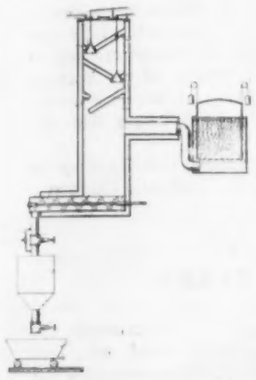
According to the present invention, a forming roll having a stationary axis is provided adapted to co-operate with a

series of flat dies in endless chain formation adapted to move axially with the tube over a plane surface opposite the roll in the manner set forth in the accompanying drawings.

The present invention is designed to form part of a tube forming machine, and the function performed by the co-operating rolls and dies, which depends upon the shape of the die surface, is usually that of effecting the final closing of the tube.

1,265,360. May 7, 1918. **Process for Producing Alkali Metals or the Like.** Walter L. Morrison, of Canonsburg, Pennsylvania, assignor to Electric Reduction Company, a corporation of Delaware.

The invention relates to an improved process for producing metals, and more particularly for the production of alkali metals, such as sodium and potassium. The main object of the invention is to provide an improved process for the obtaining of such metals in a simple and efficient manner, rapidly and without expensive apparatus. More specific objects, features and advantages will more clearly appear from the accompanying drawings.



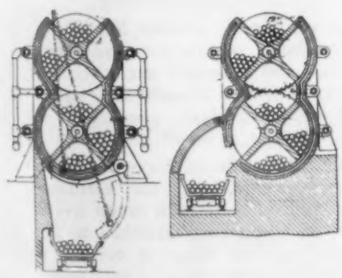
While any suitable compound of sodium may be used as a starting material, it is preferred to use caustic soda or sodium hydrate, because of its cheapness and the ease with which it lends itself to the process. The sodium hydrate is mixed with a suitable dehydrating agent. For this purpose, silicon in the form of ferro-silico (90% silicon) is preferred. Both of these materials are first preferably finely ground and then mixed in the molecular proportion of $4NaOH+Si$. This mixed mass may be then caused to react by touching the same with a red hot iron. The vigorous reaction which results progresses throughout the mass, liberating large quantities of hydrogen and rendering the mass red hot. The hydrogen may be collected and used for any desired purpose. The reaction which occurs is believed to be as follows: $4NaOH+Si=Na_2OSiO_2+4H+Na_2O$.

Thus a basic sodium silicate is formed together with some sodium oxid, which is more or less combined with the basic sodium silicate.

1,266,750. May 21, 1918. **Annealing Furnace.** J. D. Adams, North Belle, Vernon, Penn.

This invention relates to annealing furnaces adapted for the annealing of tubes or other articles to which it may be found applicable.

The object of the invention is to provide a furnace, as shown in cut, in which the operation is practically continuous, one lot of articles being charged into the furnace while another lot is being discharged therefrom, thereby giving a great saving in time and labor.



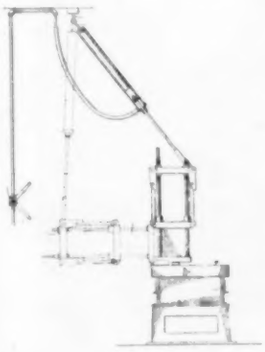
The patent covers: An annealing furnace comprising a circular heating chamber, a rotary frame mounted therein having a plurality of longitudinally extending compartments, said heating chamber having a discharge opening, and a counterweighted door normally closing said opening adapted to register with the openings in said compartments.

An annealing furnace comprising a circular heating chamber, a rotary frame mounted therein having a plurality of compartments, said heating chamber having a discharge opening, a counterweighted door closing said opening, and means operated by the rotation of said frame for opening said door.

An annealing furnace comprising a circular heating chamber, a rotary frame mounted therein having a plurality of compartments, said heating chamber having a discharge opening, a counterweighted swinging door normally closing said opening, a mutilated gear on said rotary frame, a pinion connected to said door adapted to be engaged by said mutilated gear.

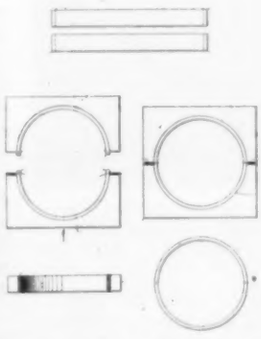
1,266,825. May 21, 1918. **Casting Machine.** John Kralund, Brooklyn, N. Y., assignor to Doehler Die Casting Company, of the same place.

This invention relates to an improved construction particularly applicable to die-casting machines, whereby a pivoted member may be quickly and easily swung, by manually controlled power means, from a vertical position to a horizontal position and vice-versa. The improvement is particularly designed for use in connection with a die-casting machine, as shown in cut, in which the die is mounted in a vertical position when the molten metal is forced therein and is then immediately swung into a horizontal position to facilitate the removal therefrom of the finished casting. Such a member has heretofore been swung from one position to the other by the workmen acting directly thereon and as the construction is rather heavy and the operation has to be repeated many times a day, the effect is wearing on the men and is not productive of the quickest results. In this improvement an air cylinder, or other fluid pressure cylinder, is so suspended or mounted and connected to the pivoted die, or member, that the latter may be swung from one position to the other by the simple manipulation of an air valve.



1,267,251. May 21, 1918. **Method of Making Metal Rings.** Thomas E. Murray, New York, N. Y.

The invention is a method of making metal rings from flat bars or plates of metal in such a way as that the ring when completed will be truly circular. The invention is more especially suited to the making of rings which form parts of structures, and therefore require accurate configuration. Such rings, for example, may be used within or without cylindrical shells or casings of sheet metal to serve as supports or strengthening ribs. The usual mode of making a ring of this kind is to draw a flat plate into a cup having its cylindrical wall of suitable width for the desired ring. The bottom of the cup is then cut off, leaving the wall in annular form. As repeated drawing operations may be necessary, and allowance must be made for consequent diminutions in thickness of the plate, and the removed bottom may be of no immediate utility, this proceeding is expensive, difficult and requires much care and calculation to insure reasonable accuracy. The invention is calculated to do away with the above objection by the utilization of electric welding.



1,266,775. May 21, 1918. **Method of Separating Nickel from Nickel-Copper Alloys.** Joseph Dhavernas, of New Brunswick, New Jersey, assignor to United States Nickel Company, of New Brunswick, New Jersey, a corporation of New Jersey.

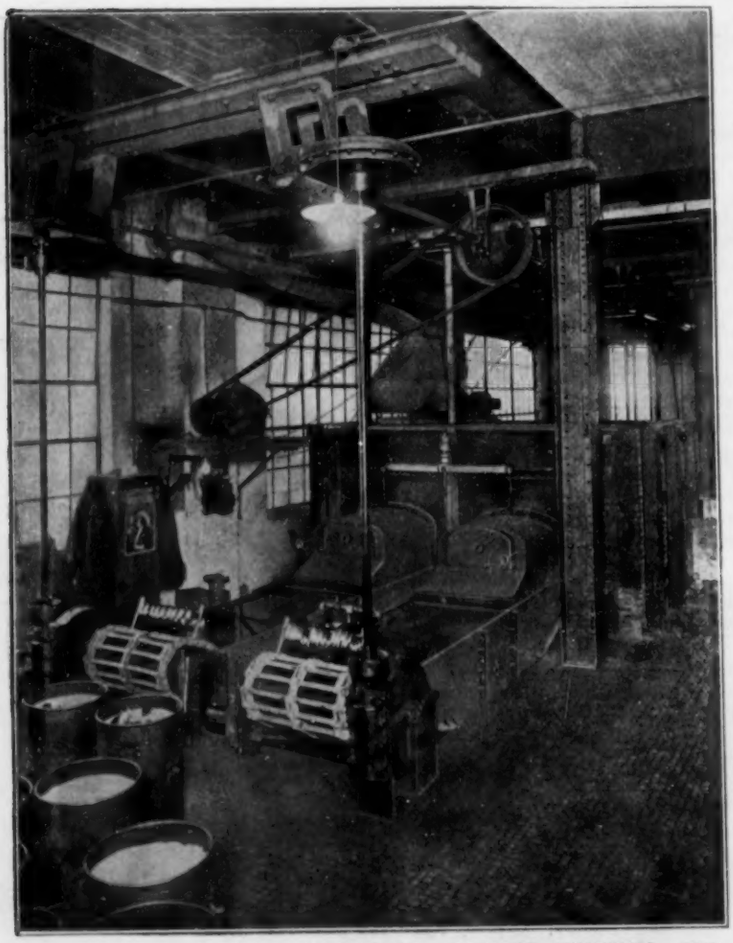
This invention relates to a method for separating nickel from nickel-copper matter.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

CONTINUOUS BRIGHT ANNEALING FURNACE

The furnace shown in the accompanying photograph is one of the well known types manufactured by the Bates and Peard Annealing Furnace Company of England, which has been built by the W. S. Rockwell Company under sole license rights for the United States, at the plant of the Waclark Wire Company, Elizabeth, N. J.



TWIN-CHAMBER BRIGHT ANNEALING FURNACE—CHARGING END. BUILT BY W. S. ROCKWELL COMPANY, NEW YORK, UNDER LICENSE OF BATES & PEARD ANNEALING FURNACE COMPANY, LONDON, ENGLAND.

As shown, the furnace has two retorts or tubes, the ends of which descend into tanks at each end of the furnace and are closed by water seals. The wire to be annealed is conveyed through the retorts on mechanical conveyors in the form of endless chain belts. The unannealed wire is placed on the conveyors at one end, is drawn first through the water seals, then through the heated retorts, then out through the other water seals, by which it is cooled, at the discharge end. The water seals form entrance and exit doors to the furnace.

Large, low-cost production of excellent quality product is the great advantage to be gained by the use of this type of furnace. A man at one end of this double-chamber furnace and another at the opposite end easily take care of the charging and discharging of the wire end of the driving mechanism shown. The wire as it is discharged from the furnace is uniformly annealed and is perfectly bright and clean, thus rendering any pickling operations unnecessary.

This type of furnace has been designed to bright anneal such articles as copper wire for electrical purposes; brass, copper, phosphor bronze, etc., as used for various purposes; flat strips, or fillets of metal; sheets, tubes, flat, rectangular, round or other section bars; gold and silver studs, sleeve links, chains, watch cases, etc.; coin blanks; cartridge cases for small arms service ammunition; and many similar articles.

The retorts of the furnace illustrated are 13 feet 9 inches long and 35 inches wide, and each retort averages 1,000 pounds of annealed wire per hour, or a total for the two retorts of 48,000 pounds in 24 hours. Between 200 and 240 pounds of annealed wire per gallon of oil is the average at the wire mill where this furnace is installed. Furnaces with one or two chambers can be built, as desired, and the size and other details of the furnace can be made adaptable for almost all plant and working conditions; that is, very much smaller or very much larger than the furnace herein illustrated.

Further particulars regarding this annealing furnace may be obtained by corresponding with the W. S. Rockwell Company, 50 Church street, New York.

NEW ENAMELING PLANT

In view of the present shipping difficulties, Government requirements and control of zinc, copper, acids, steel, etc., and with the present high cost of other methods and materials for surfacing wood and metals, the Enameling & Stamping Corporation of New York has established in Long Island City the largest enameling works in the East devoted exclusively to the service of manufacturers for work of this character.

The company has purchased the plant of the Fickling Enameling Corporation in Long Island City, at Second and Webster avenues (near the end of the 59th Street Bridge), and is now equipped for enameling of every character and in all colors. Its capacity is greatly enlarged, and still further additions are being made to ovens and equipment.

One of the quantity-production contracts now in progress (which represents only a small part of the present capacity) is the enameling of 2,500,000 pieces. The organization is under production managers who have a thorough knowledge of the requirements of the manufacturers operating on continuous production programs. They are expert in devising time-saving and labor-saving equipment and methods.

Many manufacturers, in view of the present conditions in material, labor and freight and the great importance of promptitude, are considering changes in their specifications; and the experts of the company are in many cases able to suggest changes which meet the new conditions satisfactorily.

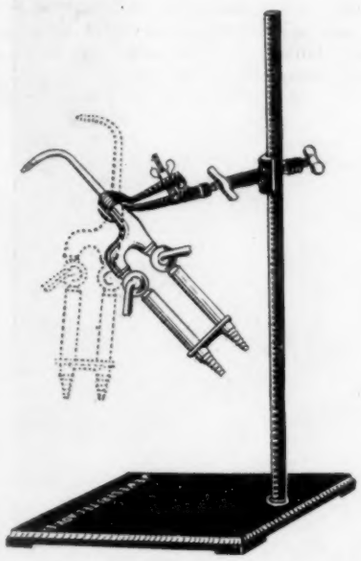
The establishment of such large facilities in Greater New York offers many advantages to Government contractors and other manufacturers. Freight difficulties and expenses are obviated. The long time during which money is tied up in unfinished goods while on rail to and from distant enameling plants is saved. The cost of traffic supervision and car-chasing is saved.

The Enameling & Stamping Corporation of New York has now available equipment, racks, carriers, etc., for economically handling articles of every kind and shape in much wider variety than is available in any enameling shop attached to the average manufacturing plant. In its own shops it constructs additional equipment of special patterns wherever a new problem in quantity-enameling presents itself. The plant is equipped for brushing, spraying, dipping, flowing, tumbling, etc.; air-drying, baking at various temperatures, under thermostatic control, etc.

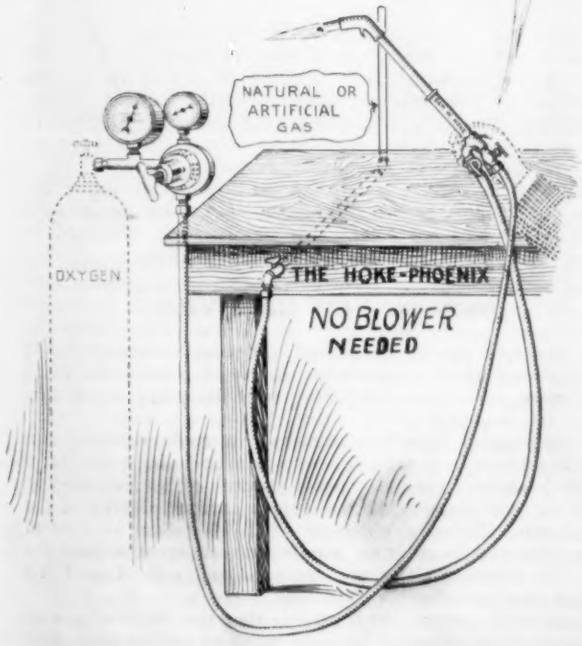
W. I. Fickling is president of the new company and associated with him is H. F. Holbrook, formerly president of the Holbrook company. As its chief production manager the company has engaged a well known expert who for twenty years past has been connected with the largest and best known manufacturers in this line.

IMPROVED MELTING, BRAZING AND SOLDERING PROCESSES

A new process for brazing, soldering, etc., which has had a four-year practical demonstration in the jewelry trade, is now being offered to the entire metal industry. The new method is called the Hoke-Phoenix, and is claimed to be much faster than the old air-blast, and much safer, cheaper and handier than the oxy-acetylene or oxy-hydrogen processes.



THE HOKE-PHOENIX TORCH.



THE HOKE-PHOENIX TORCH OUTFIT FOR MELTING METALS.

The Hoke-Phoenix torches were first made for platinum work, for which great heat is required. Later they were so improved that in addition to giving a flame of 4,000 degrees, hot enough for melting platinum, they could be used where temperatures as low as 400 degrees are enough, or for all kinds of work in between. The flame can instantly be changed from a broad soft brush, to a sharp needle; it can be either large or small, hot or cool, and a man quickly learns how to manage it perfectly.

The torches use oxygen, in connection with ordinary gas or natural gas. When these cannot be had, hydrogen or acetylene can be used, also in connection with oxygen.

SHOWING THE DIFFERENT FLAMES OBTAINED WITH THE HOKE-PHOENIX TORCH.

Oxygen can be bought almost everywhere; and the use of illuminating gas is so wide-spread that it is very strange to find a factory that is not already piped for it.

Hoke-Phoenix torches come in all sizes, for soldering the finest wire, for lead-burning, etc., up to large sizes for brazing big pieces, for pre-heating, for melting, for annealing and for any other purposes requiring heat.

The Hoke-Phoenix outfit comprises one or many torches, an oxygen regulator, and tubings. The regulator delivers the oxygen to the torches at exactly the right pressure, regardless of the pressure inside the tank, which, of course, is changing constantly. It is fitted with two gauges, to tell how much oxygen is in the tank, and the pressure at which it is being delivered to the torches.

One or two—or a dozen—outlets can be attached to one regulator, so that one or many torches can be used at the same time, all from one tank. Oxygen can be piped any distance.

Needle valves and gas cocks on the torches enable each man to regulate his flame as he pleases, without interfering with the others on the line.

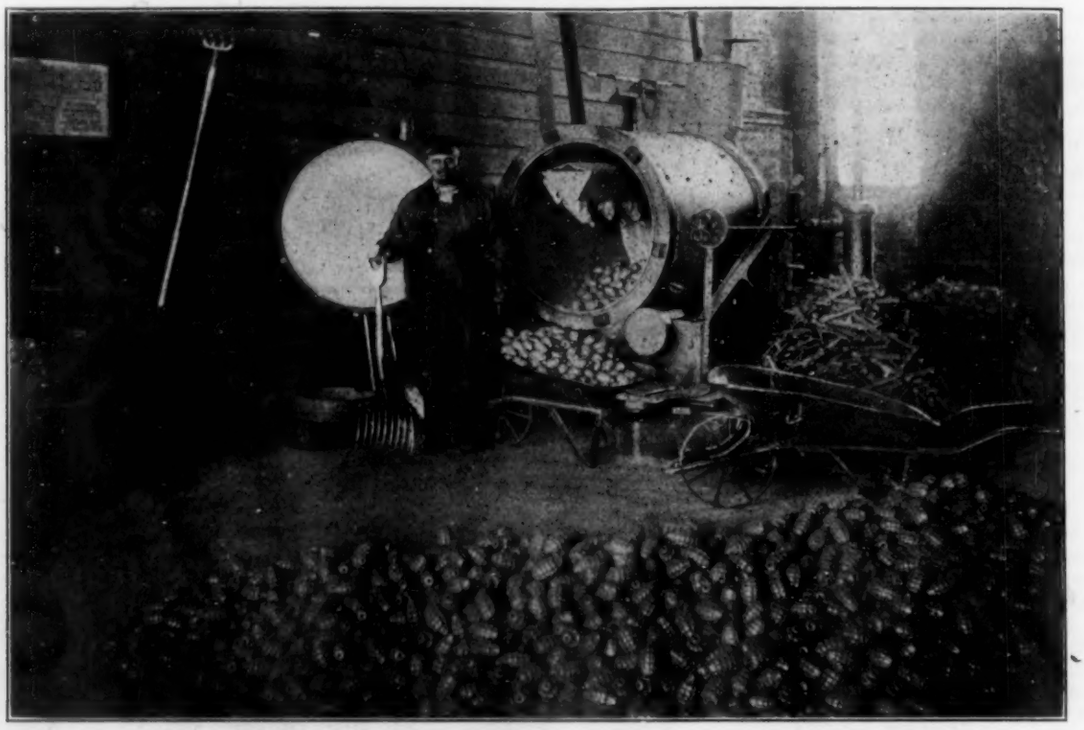
There are several advantages in having numerous outlets to the one regulator; first, the saving in expense of regulators; then the oxygen companies (who loan the tanks) charge rental on tanks kept over 30 days; by this means fewer tanks are handled, and none need stand idle.

It is claimed that the Hoke-Phoenix outfits save a great deal of time, are cheap and safe to operate, are easily handled, and have a very wide field of usefulness. They are sold by Sam W. Hoke, manager of the Jewelers' Technical Advice Co., 16 John street, New York.

SAND BLAST MACHINE

This illustration shows one of the "New Haven" sand-blast barrels installed at the plant of the Federal Malleable Company, West Allis, Wis., where it is used for cleaning hand grenades. A. M. Jones, superintendent, states that one machine turns out an average of 1,000 pounds or 1,000 hand grenades per hour. The treatment given the grenades by this machine not only cleans the outside of the castings, but also removes the cores. The abrasive used is steel grit.

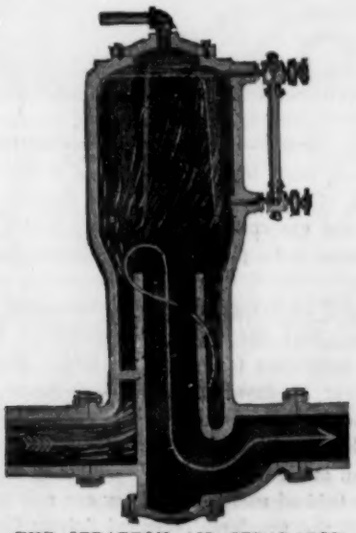
This sand blast is manufactured by the New Haven Sand Blast Company, New Haven, Conn., Charles A. Dreisbach, president.



A NEW HAVEN SAND BLAST MACHINE USED FOR CLEANING HAND-GRENADES

STRATTON AIR SEPARATOR

Water in compressed air is detrimental to the operation of sand-blast machines, air sprayers, etc., and in this connection it is interesting to note the Stratton air separator, as shown in the illustration. This unit is manufactured by The Griscom-Russell Company, 90 West street, New York, for the removal of water from compressed air.



THE STRATTON AIR SEPARATOR

The operation of this separator is purely mechanical. The air and water entering the separator pass through a helical path formed about a central core, resulting in a swirling motion. Centrifugal force throws the water out of the curving air current against the walls of the separator, where it adheres to trickle down to the receiver space at the bottom. The air passes on out of the separator free from moisture.

Because of its correct design and consequent satisfactory operation, the Stratton air separator is rapidly coming into general use on compressed air lines. The separator is described in Bulletin No. 1109-C, published by the manufacturers.

WINANS' NEW IDEA VISE

The Barnett Foundry & Machine Company, Irvington, N. J., has just brought out a machinists' bench vise under the name of "Winans' New Idea Vise" that embodies many novel features.

The adjustments from 0 to maximum are made instantly with one sliding movement. The pawl eccentric and sliding jaw form a toggle joint, bringing the greatest pressure to bear on the top part of the jaws, causing the work to be clamped tightest at the working part. The moving member of the vise slides away from the operator and there is no handle between operator and the vise. The gripping plates are hardened and ground, and the rack and pawl are also hardened steel.

A feature of especial importance is that the whole vise may be removed from its swivel base and taken to surface plate, drill press or milling machine for continuous operations, since the base of the vise is accurately machined to right angles with the jaws.

These vises are made in standard sizes of jaws, from 3 inches to 8½ inches, and openings of 3½ inches to 12 inches.

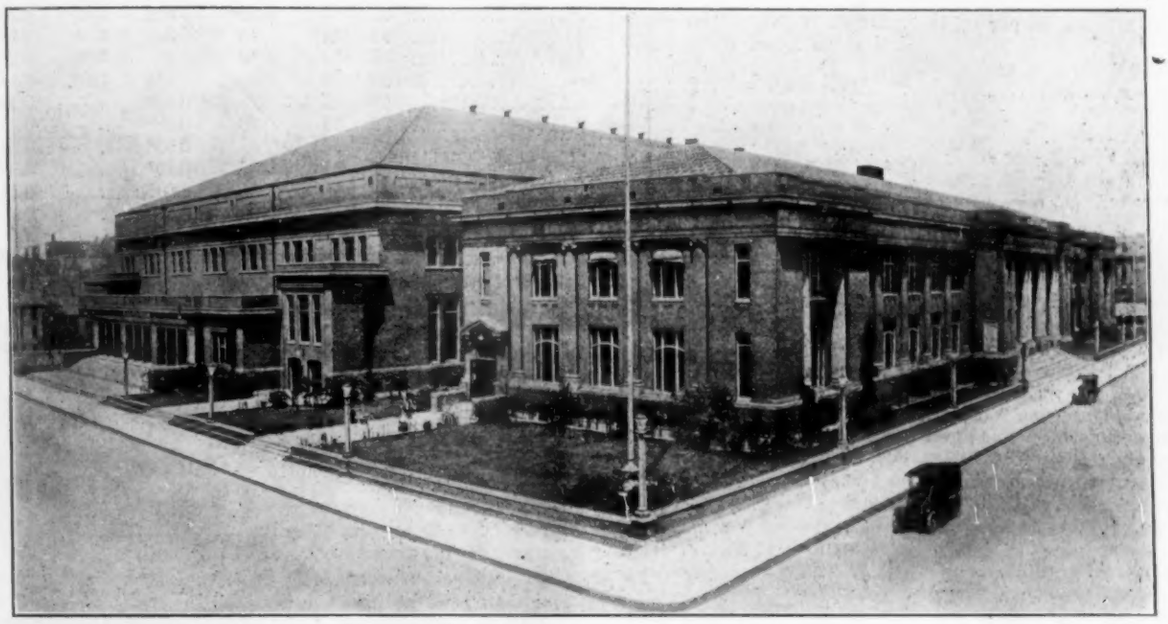
ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

C. E. Hoyt, manager of exhibits for the exhibition of foundry supplies and apparatus, to be held at Milwaukee, Wis., the week of October 7, 1918, in connection with the convention of the American Foundrymen's Association, has issued the following:

At a meeting in Milwaukee, June 13, between the officers of the association and a representative group of Milwaukee foundrymen, Mr. R. P. Tell, president of the Milwaukee Metal Trades and Founders Association, announces that Mr. Theodore O. Vilter, of the Vilter Manufacturing Company, had been chosen as general chairman of the local committees. Those who know and heard Mr. Vilter, know that Milwaukee's end in this great meeting will be ably taken care of.



THE AUDITORIUM AT MILWAUKEE, WISCONSIN, WHERE THE ANNUAL CONVENTION OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION AND THE AMERICAN INSTITUTE OF METALS, TOGETHER WITH THE CONCURRENT EXHIBITION OF FOUNDRY SUPPLIES AND EQUIPMENT, MACHINE TOOL AND ACCESSORIES, HELD UNDER THE AUSPICES OF THESE TWO ORGANIZATIONS, WILL BE HELD OCTOBER 7-12, 1918.

Milwaukee is an important city for the manufacture of war materials, and next to Chicago it is the leading foundry and manufacturing center in the west. For these reasons its selection for this year's meetings has met with general approval. Arrangements will be made for plant visitation, but it will be of interest to you to know that we have requested the local committee to avoid a program that will take visitors en masse away from the exhibits during open hours. This arrangement will insure a good attendance at the exhibits throughout the week.

The combined organizations making up this year's Congress of Metals will attract a most representative group of men. The discussions at the various meetings will have much to do with the methods of manufacture of war material, and we will make a special effort to secure exhibits of machines and equipment adapted for the manufacture of war materials.

The Milwaukee Auditorium affords the best accommodations we have ever had for the conventions and exhibits. Machinery Hall and the Arena, however, provide practically a thousand square feet less than the total used at Boston last year. This is mentioned to emphasize the importance of your making application early. Ample storage arrangements have been provided for shipments arriving early, and more detailed announcement concerning this, cartage, furniture, etc., will be made later.

AMERICAN SOCIETY FOR TESTING MATERIALS

The American Society for Testing Materials at its annual meeting at Atlantic City, N. J., June 25-28, proposed the following specifications for bronze and babbitt-bearing metals:

TENTATIVE SPECIFICATIONS FOR BRONZE BEARING METALS FOR TURNTABLES AND MOVABLE RAILROAD BRIDGES AND BABBITTS.

1.—(a) These specifications cover four classes of bronze bearing metals for turntables and movable railroad bridges.

(b) The purposes for which these classes are frequently used are as follows:

Class A, for contact with hardened steel disks under pressures over 1,500 pounds per square inch, for example, bearing metals, used in turntables and center-bearing swing bridges;

Class B, for contact with soft steel at low speeds under pressures not over 1,500 pounds per square inch, for example, trunnions and journals of bascule and lift bridges;

Class C, for ordinary machinery bearings;

Class D, for gears, worm wheels, nuts and similar parts which are subjected to other than compressive stresses.

2.—(a) The bronze shall be a homogeneous alloy of copper and tin. The copper shall conform to the requirements of the standard specifications for electrolytic copper wire bars, cakes, slabs, billets, ingots and ingot bars, or the standard specifications for lake copper wire bars, cakes, slabs, billets, ingots, and ingot bars, "high resistance" grade, of the American Society for Testing Materials. The bronze shall be made from new metal, except that scrap of known composition produced by the foundry at which the bronze is cast may be used.

(b) Care shall be exercised that the metal is not overheated and that the temperature at pouring and the conditions of cooling are such as will be most likely to secure dense castings.

3.—The bronze shall conform to the following requirements as to chemical composition:

Elements considered, per cent.:	Class A	B	C	D
Copper	about 80	about 83	about 80	about 88
Tin	about 20	about 17	about 10	about 10
Lead	.....	.....	about 10	not over 0.5
Zinc	.....	.....	.....	about 2
Iron	.....	.....	.....	not over 0.2
Phosphorus	not over 1.0	not over 1.0	0.7-1.0	.....
Other elements	not over 0.5	not over 0.5	not over 0.5	not over 0.5

4.—(a) An analysis of each melt may be made at the option of the purchaser and at the purchaser's expense. The chemical composition thus determined shall be reported to the purchaser or his representative, and shall conform to the requirements specified in Section 3.

(b) The compression test coupon shall be used for analysis.

5.—(a) The bronze shall conform to the following requirements as to compressive and tensile properties:

Properties considered	Class A	B	C	D
Compression				
Deformation limit, lb. per sq. in.	25,000-40,000	19,000-23,000	12,000-17,000	about 14,000
Permanent set in 1 in. under 100,000 lb. per sq. in., in.	.06-0.10	0.12-0.25	.....	.....
Tension				
Yield point, min., lb. per sq. in.				15,000
Tensile strength, min., lb. per sq. in.				30,000
Elongation in 2 in., min., per cent.				14

(b) The deformation limit in compression shall be determined as that load which produces a permanent set of 0.001 inch in the compression test specimen described in Section 6 (b).

(c) The yield point in tension shall be determined as the stress producing an elongation under load of 0.5 per cent, that is, 0.01 inch in a gage length of 2 inches.

6.—(a) A test bar of the form and dimensions shown in Fig. 1, to be used for the tension test specimen, and a suitable test bar for the compression test specimen, shall be an integral part of the casting, and shall be fed and cooled under the same conditions as the castings.

(b) Compression test specimens shall be cylinders 1 square inch in cross-sectional area and 1 inch high.

(c) Tension test specimens, turned from the test bar shown in Fig. 1, shall conform to the dimensions shown in Fig. 2. The ends shall be of a form to fit the holders of the testing machine in such a way that the load shall be axial.

7.—(a) One compression test shall be made from each melt for Class A, B and C castings; and one compression and one tension test from each melt for Class D castings. For castings of any grade weighing over 100 pounds finished, the specified tests shall be made for each casting.

(b) If any test specimen shows defective machining or develops flaws, it may be discarded; in which case the manufacturer and the purchaser or his representative shall agree upon the selection of another specimen in its stead.

8.—The castings shall be sound, clean, and free from blowholes, porous places, cracks and other defects.

9.—(a) Inspection may be made at the manufacturer's works where the castings are made, or at the point at which they are received, at the option of the purchaser.

(b) If the purchaser elects to have inspection made at the manufacturer's works, the inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

10.—Castings which show injurious defects revealed by machining operations subsequent to acceptance may be rejected, and if rejected, shall be replaced by the manufacturer free of charge to the purchaser. The full weight of the original material rejected shall be returned to the manufacturer.

TENTATIVE SPECIFICATIONS FOR BABBITT METAL.

1.—These specifications cover white metal bearing alloys, known commercially as babbitt metal. Twelve typical babbitt metals are specified, covering the range of alloys commercially used, and are designated as Grades Nos. 1 to 12, in accordance with their decreasing tin content as specified in Section 4.

2.—The manufacturer shall use care to have each lot of babbitt metal as uniform in quality as possible.

3.—The standard bar, unless otherwise specified, shall have the following approximate dimensions:

Top face, 1¼ inches wide, 8½ inches long.

Thickness, not over 1¼ inches.

4.—The alloys shall conform to the following requirements as to chemical composition, within the limits specified in Sections 5:

Alloy, grade No.	Tin, per cent.	Antimony, per cent.	Lead, per cent.	Copper, per cent.	Iron, max., per cent.	Arsenic, max., per cent.
1	91	4½	0.35*	4½	0.08	0.10
2	89	7½	0.35*	3½	0.08	0.10
3	83⅓	8⅓	0.35*	8⅓	0.08	0.10
4	75	12	10	3	0.08	0.15
5	65	15	18	2	0.08	0.15
6	20	15	63½	1½	0.08	0.15
7	10	15	75	0.50*	....	0.20
8	5	15	80	0.50*	....	0.20
9	5	10	85	0.50*	....	0.20
10	2	15	83	0.50*	....	0.20
11	..	15	85	0.50*	....	0.25
12	..	10	90	0.50*	....	0.25

*Maximum.

These alloys contain neither zinc nor aluminum.

5.—The following permissible variations in the percentage of the desired elements specified in Section 4 will be allowed, but shall not apply to the maximum percentages of impurities specified:

Percentage of element specified	Permissible variations over or under the specified value, units of per cent.
Not over 2 per cent.	0.25
Over 2 to 5 per cent., inclusive	0.50
Over 5 to 10 per cent., inclusive	0.75
Over 10 per cent.	1.00

6.—(a) Three bars shall be selected to represent a shipment of less than 1,000 pounds, five bars to represent a shipment of over 1,000 to 10,000 pounds, inclusive, and ten bars to represent a shipment of over 10,000 pounds to one carload.

(b) Saw cuts shall be made at points in the bars indicated in Fig. 1. No lubricants shall be used for sawing. The sawings shall be carefully treated with a magnet to remove any particles of steel introduced in taking the sample.

(c) Sawings thoroughly mixed shall constitute the sample for chemical analysis.

7.—The chemical analysis shall be made in accordance with the tentative methods for analysis of alloys of lead, tin, antimony and copper of the American Society for Testing Materials.

8.—The name of the manufacturer shall be cast on each bar. The numerical designation of the grade supplied shall be stamped or cast on each bar for identification.

A preferred arrangement of marking is shown in Fig. 2.

9.—Claims, to be considered, shall be in writing 30 days from receipt of material at the purchaser's plant, and the result of the purchaser's test shall be given. The shipper shall, within one week of receipt of such claim, either agree to satisfy the claim or send a representative to the purchaser's plant to resample the shipment, as specified in Section 6. Samples so taken shall be sealed and submitted to a mutually agreeable umpire, whose determination shall be final.

10.—The expense of umpire analysis shall be paid by the loser, or divided in proportion to the concession made in case of a compromise. In case of rejection being established, the damages shall be limited to the payment of freight both ways by the manufacturer for the substitution of an equivalent amount of babbitt metal to meet the specifications.

APPENDIX.

The data in Table I do not constitute a part of these specifications. They are given merely to indicate to the purchaser the physical properties of the various alloys specified which can be expected of carefully manufactured alloys of the formulas indicated, and to constitute a guide to the purchaser in selecting the grade best suited for meeting the service condition for which the babbitt metal is to be used.

TABLE I.

PHYSICAL PROPERTIES OF WHITE METAL BEARING ALLOYS.

Formula—				Deformation of cylinder 1¼ in. diameter by 2½ in. high at 70° Fahr., in			Brinell hardness		Melting point		Complete liquation point			Weight		Proper pouring temperature,
Alloy No.	Copper, per cent.	Tin, per cent.	Antimony, per cent.	Lead, per cent.	At 1,000 lb.	At 5,000 lb.	At 10,000 lb.	At 70° Fahr.	At 212° Fahr.	Fahr. Deg.	Cent. Deg.	Fahr. Deg.	Cent. Deg.	Specific gravity.	cu. in. per Oz.	Grams per cu. in.	deg. Fahr.
1	4.5	91.0	4.5	....	0.0000	0.0010	0.0150	28.6	12.8	453.2	234	699.8	371	7.34	4.24	120.28	824
2	3.5	89.0	7.5	....	0.0000	0.0015	0.0120	28.3	12.7	460.4	238	683.6	362	7.39	4.27	121.10	808
3	8.33⅓	83.33⅓	8.33⅓	....	0.0010	0.0045	0.0070	34.4	15.7	462.2	239	791.6	422	7.46	4.31	122.25	916
4	3.0	75.0	12.0	10.0	0.0005	0.0025	0.0090	29.6	12.8	365.0	185	555.8	291	7.52	4.35	123.23	680
5	2.0	65.0	15.0	18.0	0.0010	0.0030	0.0090	29.6	11.8	.....	...	.....	...	7.75	4.48	127.00	...
6	1.5	20.0	15.0	63.5	0.0015	0.0050	0.0180	24.3	11.1	.....	...	.....	...	9.33	5.39	152.89	...
7	...	10.0	15.0	75.0	0.0010	0.0050	0.0230	24.1	11.7	464.0	240	500.0	260	9.73	5.62	159.44	625
8	...	5.0	15.0	80.0	0.0020	0.0090	0.0620	20.9	10.3	469.4	243	500.0	260	10.04	5.80	164.52	625
9	...	5.0	10.0	85.0	0.0040	0.0120	0.0840	19.5	8.6	469.4	243	491.0	255	10.24	5.92	167.80	616
10	...	2.0	15.0	83.0	0.0010	0.0100	0.1540	17.0	8.9	471.2	244	500.0	260	10.07	5.82	165.02	625
11	...	....	15.0	85.0	0.0010	0.0100	0.1190	17.0	9.9	474.8	246	500.0	260	10.28	5.94	168.46	625
12	...	....	10.0	90.0	0.0025	0.0170	0.2850	14.3	6.4	474.8	246	509.0	265	10.67	6.17	174.85	634

AMERICAN ELECTRO-PLATERS' SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, Walter Fraine, Dayton, O. Secretary-Treasurer, Oscar E. Servis, 5305 Warner Ave., Chicago, Ill. All Correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The Society meets in convention in the spring of each year, subject to the decision of the executive committee. The 1919 convention will be held in Philadelphia, Pa. The branch associations hold monthly and semi-monthly meetings in their various cities.

Philadelphia Branch—Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, O. W. Mott, president and Philip Uhl, 2432 North 29th street, secretary.

At the June meeting the following officers were installed for the coming year: O. W. Mott, president; D. A. Metz, vice-president; Philip Uhl, secretary and treasurer; F. O'Neil, H. J. Snyder and P. Gorling, trustees; and A. Moreland, librarian.

The discussion for the evening, which was requested by a distant member, was on spotting out of brass plated antimonial lead and lead pieces. Two applicants were elected to membership. This branch will not hold a meeting during the month of July.

Providence Branch—Meets first and third Thursdays of each month at 26 Custom House Street, Room 16. Albert J. Lemrise, 124 Waverly Street, Providence, R. I., secretary.

At the June meeting it was decided to hold all future meetings on Thursday instead of Wednesday. Retiring President McDonough made a few remarks in which he thanked the members for the courteous manner in which his efforts had been received during the year, and hoped that under the able direction of the new chairman of the Board of Education, Harry Green, that the branch would make rapid progress. Honorary President Dr. Albert W. Claflin then installed the new officers for the coming year, after which the new president, George Weigand, gave a short address. Refreshments were served while a lecture on lacquers was given by S. Herrick.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES

The Fourth National Exposition of Chemical Industries will be held in the Grand Central Palace, New York, during the week of September 23 this year, its advisory committee composed of Charles H. Herty, chairman, Raymond F. Bacon, L. H. Baekeland, Ellwood Hendrick, Henry B. Faber, Bernard C. Heese, A. D. Little, Wm. H. Nichols, R. P. Perry, H. C. Parmelee, G. W. Thompson, F. J. Tone, T. B. Wagner and M. C. Whitaker. Dr. Bacon of this committee is now head of the Chemical Warfare Section of the National Army and a member of General Pershing's staff.

The coming exposition will be the largest chemical exposition ever held and it will be necessary to use four floors of the Grand Central Palace. The exposition is a war-time necessity and regarding it as such each exhibitor is planning his exhibit that it will be of the greatest benefit to the country through the men who visit it, all of whom are bent upon a serious purpose—that of producing war materials in large quantities, and constantly increasing this production till the war has been won by the United States and its Allies.

The amount of floor space already engaged is greater than last year, so the managers say, the exhibits will be much more attractive and a movement is under way to show all exhibits of machinery in operation under actual working conditions as they would be found in the field. The products of the chemicals manufactured and as they enter into the world's commerce will be there as examples of what the chemist has produced in America since the world war began.

The program for the exposition we are told is in active preparation and will be a series of symposiums on the "Development of Chemical Industries in the United States, Notably Since July, 1914." This will embrace the period since the beginning of the European war, which because of its removing the source of supply for our domestic industries inspired the development of our own chemical industries that, now, when we ourselves have entered the war, are proving so efficient.

The program of motion pictures carries forward the idea of the symposiums, and pictures will be shown of the industries that have developed in so far as they can be with propriety.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

GUILLIAM H. CLAMER

Guilliam H. Clamer, the new president of the American Society for Testing Materials, is vice-president and secretary of the Ajax Metal Company, manufacturers of bearing metals, Philadelphia, Pa. Mr. Clamer was born in Philadelphia in 1875 and received his early training and education in the public and manual training schools of that city. In 1891 he was engaged in the private chemical laboratory of Dr. F. A. Genth, while at the same time he was a substitute teacher in the manual training schools in the departments of chemistry, electricity and manual drawing. In 1893, Mr. Clamer matriculated as a special student in chemistry at the University of Pennsylvania from which he graduated in 1897. Following his graduation from the University, he became connected with the Ajax Metal Company, where he has been continuously until the present time, passing through various positions until he became vice-president and secretary as at present.

GUILLIAM H. CLAMER.

In 1898 he began the study of metallography, and was counted among the pioneers in the metallographic study of the nonferrous metals. As a direct result of these investigations, Ajax plastic bronze, a copper, tin and lead alloy, was developed, which contains a high percentage of lead, and is employed extensively for railroad bearings. Mr. Clamer carried on a controversy on bearing metals with Andrew Allan, Jr., of New York, which lasted from 1909 until 1912, and was published only in THE METAL INDUSTRY for those years. He also has been associated with Dr. Carl Hering, James Wyatt and Dr. Edwin F. Northrup, of Princeton University in the development of electric furnaces, particularly of the induction type, using both low and high frequency currents, alternating and oscillatory. As a result of this work several distinct types of electric furnaces have been developed which have proved to be commercially successful for brass melting.

Mr. Clamer has held many high executive offices in various technical bodies. He is a past president of the American Institute of Metals, now the Metals Division of the American Institute of Mining Engineers and of the Mining and Metallurgical section and Committee on Science and the Arts of the Franklin Institute. He is a member of the board of the Franklin Institute and of its committee on Science and the Arts; chairman of the committee of the Institute of Metals appointed to co-operate with the United States Bureau of Standards, and also is a member of its board. He is chairman of the committee on white alloys of the American Society of Testing Materials and also is affiliated with its committees on papers and non-ferrous alloys. When the war service committee of the American Foundrymen's Association was appointed, he was selected as the member to represent the non-ferrous casting industry, and he also is affiliated with practically all the leading technical societies of the United States and England.

G. B. Erickson, formerly with the Duluth Brass Works, and A. A. Williams, formerly of the Duluth Gas Engine Works, Duluth, Minn., have organized the Crescent Brass Foundry Company at Superior, Wis.

Charles B. Bohn, resigned several weeks ago as manager of the Aluminum Castings Company, Cleveland, Ohio, and has organized the Charles B. Bohn Foundry Company, Detroit, Mich., to manufacture brass, aluminum and bronze castings.

H. G. Spilsbury, metallurgical engineer for the Metal & Thermit Company, 120 Broadway, New York, and in charge of the alloy sales in the Pittsburgh district, recently moved to New York, and his headquarters will be in the home office at the above address.

Charles B. Seem, formerly with Perin & Marshall, consulting engineer of New York City, has become actively connected with the Electric Furnace Company, manufacturers of electric furnaces, Alliance, Ohio in the capacity of sales engineer.

DEATHS

CYRUS O. BAKER

Cyrus O. Baker, president of Baker & Company, Newark, N. J., died at Briarcliff Lodge, Briarcliff Manor, N. Y., on June 11, 1918. Mr. Baker was sixty years old, having been born in Newark, N. J., October 12, 1857, and was enucated in the public schools. As a young man he engaged in the business of refining gold and silver. When platinum came into general public notice he added that to his business, making his first experiments with platinum in the former home of his company, in New Jersey, Railroad avenue, in the early seventies. Mr. Baker saw the company, of which he was president, grow until it was found necessary to open an office in New York, and to build a large plant adjoining the old one. The local office is now located at 54 Austin street. Mr. Baker was also vice-president of the National State Bank.

CYRUS O. BAKER.

Mr. Baker is survived by his wife and brother.

DR. JAMES DOUGLAS

Dr. James Douglas, for many years president and lately chairman of the board of directors of the Phelps-Dodge Corporation, copper producer, died at his home in New York on June 25, in his eighty-first year.

Dr. Douglas was born in Quebec, Canada, and was graduated from Queen's University, Kingston, in 1858. For his work in hydro-metallurgy he later got a degree of Doctor of Laws from McGill University.

In 1875 Dr. Douglas came to the United States, and, going to Phoenixville, Pa., took charge of a copper plant. Before this he had been Professor of Chemistry in Morrin College, Quebec. When he left Phoenixville he became identified with the copper industry in Arizona, New Mexico and Sonora, Mexico, and the railroads of the Southwest and Northern Mexico.

He was president of the Copper Queen Mining Company.

which later was acquired by the Phelps-Dodge Company. In 1908 these interests were placed under the control of the corporation of the same name, capitalized at $50,000,000.

Dr. Douglas was noted as a philanthropist and mining engineer, and was rated one of the foremost metal and mining authorities in the world. He was also a historian and writer of note.

Probably his largest gift, though he had made many donations for educational and charitable purposes, was three and three-quarters grams of radium, the value of which had been estimated at $375,000, to the General Memorial Hospital in this city. The radium has been used in the treatment of cancer and other diseases, and was the product of many years' work of the National Radium Institute on carnotite ores.

ARTHUR O'KEEFE

Arthur O'Keefe, for many years with the J. B. Ford Company, of Wyandotte, Mich., and prominent as a member of the Detroit Branch of the American Electro Platers' Society, died at his home in Detroit, Mich., June 30. He was 57 years of age.

Mr. O'Keefe was stricken with apoplexy while on business in Pittsburgh, Pa., on June 26, but recovered sufficiently to return home unassisted. He was stricken again on June 30, and only lived a few hours. Mr. O'Keefe's death was the one sad feature of the convention of the American Electro Platers' Society which opened in Detroit the day of his funeral. Resolutions of sympathy were passed at the convention and sent to the family.

ARTHUR O'KEEFE.

Mr. O'Keefe was acknowledged as one of the expert platers of the country, and his advice on technical matters pertaining to the plating business was consulted by many in the trade. He is survived by his wife and several children.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

BRIDGEPORT, CONN.

JULY 8, 1918.

The vague mutterings of labor trouble which have been heard around the city for some months past, broke forth in Bridgeport this week when the machinists of the city demanded that the manufacturers here accede to their wage demands made some time ago, and in order to make their stand more forceful, have left the shops and factories where their demands have not been met. The total number of men on strike at present cannot be ascertained definitely, the Manufacturers' Association claiming that not over 2,500 men have gone out, while the Machinists' Union states that over 7,000 have gone on strike and that more will be added daily until the argument is settled.

Early in the week a telegram was received by the machinists from Secretary of War Baker stating that he had asked the manufacturers not to fix a wage rate until the matter was settled nationally by the Taft-Walsh board. In his telegram the Secretary urged the men to remain at their jobs and stated that he expected the men to stand behind the government until the matter was settled. In spite of this, however, the machinists left the shops and declare they will remain out until word comes from Washington that their demands have been met.

With scarcely a single exception the strikes have occurred in factories which are employed on government work, the Browning machine gun being the article manufactured in most cases. The Remington Arms Company, which is the largest maker of the gun, has suffered heavily in the strike and although some of the men returned after the first day of the strike, the number of men returning compared with the total leaving the factory is very small. Machinists in the U. M. C., the Singer Company, which is manufacturing parts for the Browning gun, the Lake Torpedo Boat Company, the Bridgeport Brass Company, and about 155 other shops in the city have been affected by the strike.

It is estimated that a total of 161 shops in the city have lost machinists through the strike, but not all of the men in all of these shops have left their work. About twenty or twenty-five of these factories are of the larger class while the rest are smaller shops being engaged on sub-contract work.

The trouble started originally when the machinists of the city, over a month ago, asked for an increase in wages. There was some trouble at that time but the matter was finally left for a decision to the government, both men and manufacturers agreeing to this plan. A decision was to have been given on the case by the middle of June and if the raise was to be granted it was to take effect from May 1.

The machinists, however, tired of waiting for action on their demands, forced an issue early in the week when at the plant of the American and British Company they notified company officials that they would be given until 10 o'clock on the following day to post a notice that the raise was to be put into immediate effect and be retro-active from May 1. This the company failed to do with the result that the machinists went on strike, to be followed shortly by machinists on the other factories in the city.

Manufacturers in the city are taking the stand that the matter is one to be settled by the government as the government is more immediately concerned inasmuch as it is on government work that the machinists were employed. Factory officials obeyed Secretary Baker's request to postpone a settlement of the wage question until the matter had been investigated by the Taft-Walsh board and as this action precipitated the strike they are of the opinion that it is up to the government to settle it.

In the meantime city officials and factory authorities are making investigations into the status of strikers in the "work or fight" law and in draft classification and there is a probability that the strikers may be either drafted into the army or drafted into industrial work by the government irrespective of the wages to be paid them.

Representatives of the local union are at the present time in Washington before the Taft-Walsh board endeavoring to reach an agreement and until a decision is made there the chances are that the strike in this city will continue.—L. M. P.

TORRINGTON, CONN.

JULY 8, 1918.

With practically all the factories operating to full capacity day and night and with shipments of raw materials and fuel coming along without serious interruption, the outlook of the metal and other industries in Torrington is most favorable.

Many communities in Connecticut and elsewhere are having trouble over their fuel shipments, but Torrington is most fortunate in this respect. The local fuel administrator, George H. Atkins, is authority for the statement that so far as fuel for the manufacturing plants is concerned, conditions here are 25 per cent. better now than they were at this time last year. Unless unforeseen contingencies arise there is not much likelihood that Torrington plants will have to close down at all during the coming season because of lack of fuel. The average consumption here per year for manufacturing purpose is 40,000 tons of anthracite coal and 50,000 tons of bituminous.

The shipment of raw materials and completed products is proceeding satisfactorily, although motor truck transportation is being used more than ever. Between 25 and 30 per cent. of the shipments are now made by motor truck. Through lines are being operated between Torrington and Boston, New York and other centers. Rates by motor truck are approximately 65 per

cent. more than the regular freight rates, but in order to move shipments, the manufacturers do not hesitate to make use of the new method, thereby lessening the congestion on this division of the New Haven railroad. The Litchfield County Automobile Club is co-operating in this work by organizing a Return Load Bureau, arrangements for which are in charge of the secretary, Charles B. Moore, of Winsted.

Prices of materials are not exorbitant in view of existing conditions. Furthermore several of the larger plants have fairly large stocks on hand.

Seventy-five to ninety per cent. of the total output of all Torrington plants is munitions or other war supplies of one kind or another. Some of the factories, it is predicted, will be turning out 100 per cent. war supplies within a short period. The Coe Brass Branch of the American Brass Company has an output of war supplies which varies from 90 to 100 per cent. of its total production. The only part of its output classed as non-essential is for local orders and a large percentage of this is in turn used in the manufacture of war supplies. The plant is refusing many local orders for non-essentials. The war munition departments of this and the other shops are operated day and night; only the non-essential producing departments are shut down at night.

Out of the 10,000 workers in Torrington, close to 8,000 are engaged exclusively in the manufacture of war products.

Torrington like all other manufacturing communities is experiencing more or less trouble in securing labor. It is estimated that approximately 85 per cent. of the workers engaged here last year are still on the job. At present there are between 300 and 400 children over 14 years of age, assisting in the production. Efforts were made to secure permission to employ children between 13 and 14 during the summer months, but the Connecticut State Board of Education refused to sanction this. Hundreds of these youngsters are helping in agricultural pursuits, however, thereby releasing some of their elders for factory work. Women are entering many of the shops; and 75 per cent. of them are engaged in doing work formerly done by men. They are equalling the men in quality of production but not in volume.

The Official Bulletin published at Washington announces every few days the awarding of government contracts to one or another of the Torrington plants. More contracts could undoubtedly be secured, but the plants are already working to full capacity.

Taking it altogether the situation here is most satisfactory.

The Torrington Company, which owns the Excelsior Needle, Progressive Manufacturing and Standard plants, has purchased the Conley Inn property on Main Street for a home for its young women employees. The deal involved $75,000 and was the largest single real estate deal ever recorded in Torrington.

With the closing of the public schools for the summer many of the teachers have secured employment in local manufacturing plants which are engaged in the manufacture of munitions and other war supplies. In one factory alone, 30 teachers have secured employment for the summer.—J. H. T.

NEW BRITAIN, CONN.

JULY 8, 1918.

The advent of the summer months sees the manufacturing interests in New Britain with an ever increasing amount of business to handle, most of which is for the government or for other firms which in turn are producing government articles. Help is difficult to secure and wages higher than ever before are being paid to skilled mechanics and laborers alike. So great is the demand for labor that women and girls are being freely employed in most all of the local concerns, taking the places of men who have entered the army or navy or the shipbuilding service. These women are doing all kinds of work from inspecting to operating automatic machines. As has been the case for the past year or more, the New Britain Machine Company is the leader in the local metal manufacturing concerns. Not only is a night and day shift being worked, but also a new factory, the second within a few months, is now in process of construction and will be finished in record time. The Machine company is turning out automatic devices for machines and is also dealing extensively in anti-aircraft gun mounts. White motor chasses are shipped to the local factory, as are the finished guns, where they are assembled completely, even to the camouflaging of the gun barrel, mount and truck. The grim devices of war are then driven to a point on Long Island sound where they are subjected to government tests before being placed in commission.

Gas masks continue to be an important product manufactured here and everything from the metal braces and stays to the completed garment are made at one or another of the shops. Carloads of these masks are sent away from here weekly and a large number of women and girls are being employed in the manufacturing of them. Hand grenades, millions of them, are being turned out and at the P. & F. Corbin division of the American Hardware corporation the output of these little devices of death is said to be enormous. This concern is also doing a big business in ordinary stock goods, such as locks, lifts, etc., many of which are used on new army cantonment buildings, ships, etc. The Stanley Rule & Level Company, which in peace times does an enormous business throughout the entire world in builders' hardward, is also doing an extensive business in war goods. Unlike many of the other factories, however, this company's war orders consist chiefly of a greater production of its staple products. Hundreds of thousands of saws, hammers, screw drivers, planes, squares, levels, etc., are being made here for this government as well as the Allies. These, of course, are used by the army behind the army behind the guns. They are used by the civilian workers in preparing new buildings and homes for munition works and workers and for the erection of army cantonment barracks, as well as in the front line trenches. Many little screw drivers for use by machine gunners in assembling and taking apart their weapons are also being turned out, as are little glass levels and gauges which are also used by artillerymen and machine gunners in their work at the front.

Landers, Frary & Clark, busier than ever if such is possible, today has a large corps of ordnance officers at work at the factory inspecting the output and supervising the work. Knives, army utensils, sabers, gas masks, and other government products are being made in large quantities. In fact this factory has gone into war work so extensively that its domestic trade is suffering and the sales department is reported as being behind several hundred thousand pocket knives alone. The Stanley Works, especially in the cold rolled steel mill, is bustling with activity and the Fafnir Bearing Company is also very busy. This concern makes a high grade ball bearing, many of which are used by the government in ordnance. The Traut & Hine Manufacturing Company and the North & Judd Manufacturing Company continue their extensive war work and the Hart & Cooley Company is preparing to expand its business.—H. R. J.

HARTFORD, CONN.

JULY 8, 1918.

Transportation problems and the problem of getting labor are the two things that form the chief source of worry to the plants here engaged in the metal trades manufactories. Connecticut, which is manufacturing something over fifty per cent. of the munitions in the United States, has Hartford for one of its chief manufacturing centers, and at times these problems, especially the matter relating to transportation, has been acute.

All the factories are working overtime, and on war business, including everything from finished fire arms of all sizes and calibers to the leather findings for the army.

A system of motor truck transportation, worked out by a subcommittee of the Connecticut State Council of Defense has relieved this condition somewhat, but still the raw material and fuel is not coming fast enough to satisfy the manufacturers.

Since the war began, some of the plants have doubled and tripled their production capacity, expanding as fast as the material and labor markets would permit, in the effort to keep up with the demand for supplies for the army and navy. During the summer months the transportation problem is somewhat easier, because the Connecticut River is open to navigation, and much of the product is handled by water to New York, relieving the railroads and the motor truck system.

The Pratt & Whitney Company of this city, a part of the Niles-Bement-Pond combination, employing 3,500 hands in its local plant, has undertaken welfare work among its employees on what is believed to be the largest scale of any plant in New England. Carl Marshall, formerly with the New Departure Manufacturing Company, of Bristol, Conn., is the manager.

It has just been announced that the company has insured all its employees from the apprentice boys to the oldest employees, under a group insurance plan. This is without expense to the employees, including a number of women.

The company, under Mr. Marshall's management, has established a club room in the plant for employees; an orchestra of employees has been organized; and a suggestion box has been inaugurated. Into this box employees may drop suggestions in writing for improving the efficiency and production of the plant, and all suggestions accepted are paid for in accordance with their value.

On July 20 the company will give its employees an all day picnic at Charter Oak Park, providing every kind of amusement for the day without cost not only for the employees, but their entire families. About 15,000 people will be entertained that day at sports and at dinner at the expense of the company.

The company is rushed with war time orders, working overtime, but is still finding time to look after the welfare of its employees, leading all the other big Hartford manufactories in this idea.—D. W. N.

PROVIDENCE, R. I.

JULY 8, 1918.

With the end of June comes the close of the first six months of the year which, like the similar periods for the past three years, have been history making times, attributable almost entirely to the conditions brought about through the great world war. But each month seems to add its own problem to the many perplexities that harass and handicap the various plants engaged in the numerous branches of the metal trades. Other industries have their difficulties and problems, but the metal trades are especially beset.

In one respect the situation in the metal plants throughout Rhode Island is practically unchanged. All are working to their capacity, in-so-far as the labor situation will permit. And herein lies one of the greatest problems that the manufacturers and other employers of labor are having to cope with. The majority of the plants have orders piled up either directly or indirectly for the Government, but each week witnesses a decrease in the number of operatives through men leaving to take service directly for the Government, either in the military branch or in some industrial capacity where their knowledge and ability acquired in the local metal plants commands higher compensation.

As far as is possible every metal plant of every description is pushing its output as rapidly as possible so as to take full advantage of the daylight saving, fuelless days and to produce all that they can pending further changes or curtailments of their working forces. Transportation facilities are also causing much concern because of present delays and future uncertainties.

Perhaps the branches of the metal industries connected with the manufacturing jewelry business are the most chaotic of any because of the assumption, apparently in official circles, that jewelry is a non-essential and so can be eliminated, partially or wholly. In consequence there has been much curtailment in its supplies of chemicals and metals and other materials; less consideration as to its fuel supply and larger numbers of its operatives have been transferred to other positions.

Not only are the manufacturers and employers of labor confronted by an increased shortage of man-power but also by the frequent demand for higher wages. Notwithstanding the repeated advances that have been granted labor becomes more and more insistent with the consequent unrest and attendant loss of productiveness, that the employers are powerless to stem. In many instances metal working plants are paying almost fabulous wages to men who in normal times would not be tolerated for a minute in the shops.

With all the industrial activities the metal trades have been prominently identified in all the patriotic, philanthropic and charitable movements that have been such a feature of the past six months and as individuals and shops—employers and employes—have taken part or given liberally to all the various drives, funds and other enterprises. Many hundred of the employes have gone into the service in response to the call to the colors and while no records are obtainable in actual figures it is known that subscriptions amounting to several hundred thousand have been made by the metal industries of this State for Liberty Bonds, War Savings Stamps and the Red Cross, Y. M. C. A., etc.

The Washburn Wire Company is erecting a brick addition to its manufacturing building at Phillipsdale that will be 84 feet in length and 18 feet wide. It will have a monitor hip roof with steam heat.

The contract has been awarded for an office building on Adelaide avenue for the Gorham Manufacturing Company, to be of frame, one-story high, 42 by 25 feet. This concern is also to build a guard house on Adelaide avenue. It will be 16 by 20 feet, of frame construction, with concrete foundations.—W. H. M.

ROCHESTER, N. Y.

JULY 8, 1918.

The situation in this city, so far as the metal-using industries are concerned, is unusually satisfactory at this particular time. Every manufacturing plant is running at top speed, and men and materials are obtainable in reasonable measure so that there is no immediate prospect of a shortage or even a temporary interruption of business.

The shipping situation in Rochester has improved to a considerable degree during the past month, which has had a marked effect on industry in general. Many metals that were slow in delivery are now reaching the big city plants in one-third less time than was required early in the spring. With satisfied workmen and a fair supply of skilled help, local manufacturers are not in a complaining mood.

In some of the larger plants, particularly those devoting the bulk of their attention to war orders, there is a steady and increasing demand for skilled labor. Such concerns as the Eastman Company, the Bausch & Lomb Company, and the Symington munition plants are constantly in need of additional machinists, toolmakers, screw machine hands, etc. The wage conditions seem to be happily adjusted for the time being.

Owing to the tremendous pressure exerted on all the war munition industries the demand for copper and brass materials is very strong now. Copper in itself is not so strong as the brass products. Deliveries of copper have improved of late, and can now be depended upon in from two to three months.

Brass is in very strong demand and is being used in immense quantities here. The base price for brass sheets in Rochester is 26c., while brass rods are quoted at 23c. Deliveries are slower, because of the much larger contracts being received and filled by local users of the metal. In fact more brass materials are now being employed in this city than at any time in the history of the local manufacturing industry.

Aluminum is in steady demand, but difficult to obtain. The small percentage of the metal that is not already under government contract is so insufficient that the supply has become almost undependable. No quotations are announced here for this metal.

The market for tin is very high at this writing, the supply of pig and sheet tin being very scarce. The demand is strong, and quotable at 95c.

Zinc is strongly held and in firm demand. There has been little change in the spelter market here in the past year. It is quoted in Rochester at 16c.

Nearly every large plant here is a user of lead, and that metal is always in great demand. Trust prices, of course, prevail without change. The metal is readily obtainable and shipments are rarely subject to delay.—G. B. E.

MONTREAL, CANADA

JULY 8, 1918.

The midsummer trade in the metal line of this city is very brisk at this time of year and prospects look very bright. The Imperial Munitions Board of Canada, which has control and supervision, also the letting of all contracts for Government work,

has during this month placed some very large orders here with the different manufacturers. Some of the different manufacturers have also received increased orders from the American Government for shell forgings and component parts which are composed of brass, bronze, etc.

Crane Company, Limited, has been incorporated at Montreal and sell all kinds of steam, gas and water, brass goods, and carry on a general engineering business. The incorporators are: E. G. Bennet, A. B. Wright, C. Arnold, A. Charers and A. Mathew, and was organized as a branch of the Crane Company with factories at Bridgeport, Conn., and Chicago, Ill. A large tract of ground has been secured on St. Patrick street bounded by the Lachine Canal and G. T. R. R., which offers ideal shipping facilities. Plans are now being drawn for a model manufacturing plant comprising iron and brass foundries, machine shop, office and warehouses which will cost $1,000,000 when completed.

The firm of Fred Thompson Company, Ltd., has erected a new three-story brick and basement addition to take care of its increasing business. This firm is manufacturing all kinds of electrical supplies.

The Mason Regulater Company, Dagenais street, is now located in its new factory and Mr. Peiler, the manager, reports quite a demand for the products which they are now manufacturing here and some of the lines they import from the factory at Framingham, Mass., but which they will eventually manufacture in Canada to evade the heavy custom duties.—P. W. B.

DETROIT, MICH.

JULY 8, 1918.

The brass, copper and aluminum plants are all operating to the fullest capacity and within the last week or so have been continually speeding up in order to meet with the demands of the government. The automobile plants, to a greater extent than ever, are devoting their attention to munition work, cutting the output of pleasure cars to the minimum. The greatest handicap at present is the lack of skilled mechanics and so acute is the situation that girls are being trained to operate lathes and work in the plating plants.

So heavy is the demand for labor that it is almost impossible to obtain servants in the homes and scores of women who never before engaged in household duties are now forced to work in the kitchen, girls formerly engaged as servants and maids, being employed in the munition plants.

The Detroit industries at present are facing critical times as to supplies. It is very difficult to obtain the necessities needed in many lines of the brass, copper and aluminum plants.

The coal situation also is serious and while the supplies are fair now the outlook is none too good.

Transportation also is limited and it is hard to obtain cars for extensive shipments. What the future will be no one knows except that Detroit munition plants are determined to do their share in defeating the Kaiser.

The shipbuilding companies are now heavily engaged on ocean-going vessels, a number being launched July 4. These boats are heavily equipped with brass, copper and aluminum trimmings.

The electro-plating plants also report heavy work, practically all being engaged on munition work.

Many plants engaged on munitions were unable to make exhibits at the recent annual convention of the American Electro Platers' Society here, simply announcing they were too busy to make exhibits.—F. J. H.

CINCINNATI, OHIO

JULY 8, 1918.

The immense stimulus afforded by the war to virtually every branch of the metal trades continues to be very much in evidence, and machine shops, machine-tool manufacturers, foundries and metal-working establishments are busier than ever before in their history. Many such concerns have found it necessary to provide for additional working space, and their sales are limited, practically speaking, only by the increasing difficulty of securing an adequate number of workers to meet their needs. The experiment of hiring unskilled workers, who are trained while working, and of using women in the lighter operations, is being tried in several of the big machine-tool plants with satisfactory results, and it is probable that this will eventually have to serve as the solution of the difficulties faced by the manufacturers. In most cases the realization among the employes that their work is of direct use in winning the war, and the bonus and extra-pay systems of compensation in vogue, have brought about a high degree of efficiency, and conditions in this respect are as good as could be desired. While transportation facilities are not yet up to a satisfactory point, improvement has been noted lately, and it is expected that as time goes on the effect of Federal operation will be still further improvement.

The Ansonia Copper & Iron Works, which has for some time been producing copper apparatus for use in the manufacture of nitrates by an air process, has secured a lease on a nearby plant which will be used exclusively for making and assembling this machinery. The demand for the equipment has recently received a considerable impetus on account of the interest of the Government in the production of nitrogen, and especially on account of the fact that an enormous plant will be built near Cincinnati for this purpose.

H. H. Suydam, president of the Cincinnati Manufacturing Company, one of the leading metal concerns of the city, has been made chairman of one of the sub-committees of the metal trades in the Cincinnati Subregional Department of the War Industries Board. These committees will list all concerns capable of doing war work and see that they are properly utilized.

Members of the Metal Trades' Association, Cincinnati section, made a trip to Dayton, O., recently, for the purpose of inspecting and securing a first-hand idea of the operation of the factory "vestibule schools" established in some of the large plants there for the training of unskilled workers. In these schools, which are really miniature plants, the new workers are given an opportunity to become familiar with the machines used in the plants, and the operations of the plant proper are not interfered with by the awkwardness of unskilled employees. According to Secretary J. M. Manley, of the Metal Trades' Association, the idea and its working impressed the Cincinnati visitors very favorably, but no definite plans have yet been worked out for the utilization of the idea in Cincinnati plants.

The Lunkenheimer Company, which has always been progressive in its handling of employment problems, is planning the construction of a good-sized welfare building for the convenience and comfort of women workers, whose number has increased greatly in the big Lunkenheimer organization during the past year or so. Recreation, toilet and eating facilities will be provided in the building.

The Warman & Wolf Aluminum Foundry Company has moved from Central Avenue to its Norwood plant, which was recently leased, and is well settled in its new quarters, and making excellent progress on the Government work which necessitated the move.

The Queen City Brass Foundry Company is building an addition to its plant on Spring Grove avenue, more space being required on account of the activity of business.—K. C. C.

COLUMBUS, OHIO

JULY 8, 1918.

The metal market in Columbus and central Ohio territory has been quite firm during the past month. Buying is mostly for immediate delivery, although some metal using concerns are trying to accumulate surplus stocks. Shipping facilities continue quite bad and all consignments are slow in arriving because of the railroad congestion and embargoes.

Prices are firm at the levels which have prevailed for some time. Practically the entire list is firm, with the possible exception of aluminum. Spelter and lead are stronger than was the case a month ago. Brass is in good demand and prices are: Yellow, 16 cents; red, 22½ to 23 cents. Copper is moving well and is selling at 23½ cents for scrap. Aluminum is quoted around 35 cents, while lead is now 8½ cents. Spelter is selling at 8¾ cents. One of the strongest points in the market is type metals which are selling actively. There is a scarcity of available stocks of type metals.

The Atlas Brass Foundry Company, of Columbus, Ohio, has found its business increasing so rapidly as to necessitate another increase to its plant and is now building a three-story addition.

The Products Plating Works Company, of Cleveland, has been incorporated with a capital of $15,000 to do a plating business. The incorporators are Martin N. Bailey, Frederick A. Brug, Emmet P. Dowling, Mrs. Mary A. V. Brug, Miss Jacqueline La Rue.

The Cleveland Smelting and Refining Company, of Cleveland, has been incorporated with a capital of $200,000 to do smelting and refining. The incorporators are George B. Harris, S. M. Davies, S. G. Rogers, S. Y. Allen and F. F. Deam.

The Brown Metal Company, of Cleveland, has been incorporated with a capital of $10,000 to deal in metal articles. The incorporators are: Harry Lishawitz, Louis Tolen, Rose Brown, Edna Lishawitz and A. Brown.

The Hoffman Bronze and Aluminum Casting Company, of Cleveland, has been incorporated with a capital of $30,000 to manufacture bronze and aluminum castings. The incorporators are: Robert S. Hoffman, Fred F. Klingman, John V. Jenkins, Clayton C. Townes, and M. R. Burnage.—J. W. L.

CLEVELAND, OHIO

JULY 8, 1918.

Probably no development in connection with the war since this country entered the conflict has affected the metal industry of Cleveland and northern Ohio so favorably as has the "work or fight" ruling from Provost Marshal Crowder's office, effective July 1. It has been significant in the last few months that many young men, while awaiting action of the draft boards on their cases; that is, those not in the first class, have quit their jobs. Now that they must work or fight, there is a rush of applicants for all manner of employment in munitions plants here, and this is reflected all along the line in every branch of the industry contributing to war activities. Incidentally, there is hardly a plant here, small or large, which is ont doing some war work, directly or indirectly, and this ruling already has caused the speeding up of production. In one day, according to City-State Employment Bureau officials, there was a 100 per cent. increase in applications for work in all kinds of factories, following the announcement that there are 15,000 jobs of one kind or another available.

Metal industry firms here see a better chance for business, in that the movement of finished and semi-finished materials to consuming points may be speeded up, in the appointment of Myron T. Herrick, former ambassador to France, as one of the twenty directors of industrial zones, appointed by the War Industries Board. Mr. Herrick will have general supervision of the production of war materials in the Cleveland district, which includes the northern half of Ohio and three counties in Western Pennsylvania. This district was organized several months ago by the Cleveland War Industries Commission. It includes something like 5,000 manufacturers who have been formed into a single industrial unit. All information pertaining to this unit, including capacity, equipment, number of employes and the like, has been classified, so that instantly the government can ascertain what the district can produce.

Remarkable expansion in the metal industry is noted this month, in spite of the limited resources for new building purposes here. Foremost among these is the purchase by the Buckeye Brass and Manufacturing Company of property in the southeastern part of the city from the Cleveland Pneumatic Tool Company together with some equipment. This purchase will enable the company to increase its output, as it is now running to capacity in its present location in Columbus Road, in the southwestern part of the city. The Buckeye plant has been in operation for eight years. H. Selker is president of the company; L. J. Allmendinger, vice-president, and N. M. Carl secretary-treasurer.

The Aluminum Rolling Mills Company has acquired five acres of land in the east end factory district from the Cleveland Metal Products Company. There are two monitor type buildings, with a connecting building between, on the property. The Aluminum Rolling Mills Company was recently incorporated for $1,000,000.

Close to 2,000 employees of the Cleveland Metal Products Company are starting this month as reporters, to send news to the young men, formerly with this organization, and who now are either in camps or fighting the Germans in France. A weekly news letter will be sent out to every one of the 250 lads who have joined the colors. So promising is this plan of keeping the company's boys in close touch with happenings at home, that other metal industry plants are considering adopting the same scheme. Captain Frank E. Hollenbach, production manager of the Cleveland Metal Products Company, is the managing editor of this news letter. The news is gathered by every one connected with the establishment, gone over by foremen of the different departments, and then passed on to Captain Hollenbach, and a correspondent writes the letter. It will go into the mails every Friday afternoon.

Dedication ceremonies marked the actual operation of the Glenn L. Martin Company's aeroplane factory in the East End. Celebreties in aeronautics were present, including Joseph A. Steinmetz, president of the Aero Club of Pennsylvania, and C. C. Scott, president of the Alcott Motor Company, San Francisco. This plant just dedicated will make war aeroplanes exclusively. The first of these battle planes will be flying some time this month, says Glenn L. Martin, president of the company. From then on it is expected every ten days will see a finished plane from this plant, and after October a plane a day is the program. The festivities at the dedication were held primarily to urge the employes to extend themselves in production, and all signed a pledge to work full time as long as the war lasts.

The Crescent Brass Manufacturing Company has bought land and buildings on the West Side. C. F. Hofrichter is president of the company.—C. C. C.

LOUISVILLE, KY.

JULY 8, 1918.

Conditions with the metal working trade and coppersmiths of Louisville are excellent at this time, and practically all of the shops have about as much business as they can comfortably handle after a period of lean months. Plenty of war work is coming in, with indications of much more to follow.

Through the efforts of the Louisville Industrial Foundation and the Louisville Board of Trade the War Industries Committee has been formed, fifty members of the Board of Trade having each subscribed the sum of $20 per month for a fund of $1,000 which will be used to maintain a war order bureau in Washington to secure industrial orders for local manufacturers. This bureau will look after the interests of general manufacturers, and has secured a good man to handle the Washington office.

Considerable copper and brass work is in prospect in connection with the Government powder plant to be erected at Louisville by the du Pont interests for the Government. This will be a hugh plant, its size being demonstrated by the facts that it will consume 100 cars of coal daily. Just what acid products it will make have not been announced as yet, but indications are that some excellent metal contracts will be let.

The Standard Sanitary Manufacturing Company is busily engaged in completing its big brass handling plant at Louisville, which has been greatly enlarged through moving the Pittsburg, Pa., brass works to the Louisville plant. The machinery has practically all been set up, and operations will begin at an early date.

The O. K. Sheet Metal Works, capital $1,200, has been incorporated by John V. Kemper, Jacob Koenif and John D. Painter.

The Vendome Copper & Brass Works is being kept very busy with several Government contracts, principally for work to be used on destroyers and submarines.

Hines & Ritchey are handling some war orders, but are giving most of their attention to manufacturing milk machinery at the present time.

Government orders and regular domestic business is keeping the Independent Brass Works operating overtime. The local shops are so busy just now that small casting work is hard to place.

The Bourlier Sheet Metal Works has let a contract to C. A. Koerner for construction of an addition to the plant at 912-14 South Eighth street.

Amended articles of incorporation have been filed by the J. J. Reilly Manufacturing Company, manufacturers of pumps, increasing the capital stock from $50,000 to $150,000.

The Park City Machine & Foundry Company, Bowling Green, Ky., has been sold by Charles Roemer to M. E. Morrison.

An interesting article was recently printed in the local papers relative to the early activities of the firm of Grainger & Company, workers of iron, brass and other metals. This concern was founded in 1833 by William H. Grainger, in a plant consisting of four small buildings, and was operated as the Phoenix Foundry, handling most of the brass and copper work of the city in that day. Today the plant covers several acres, and is still headed by a son of the original founder, in the person of Charles F. Grainger, former mayor of Louisville. In the early days the plant handled steamboat work and millwork principally. —O. V. N. S.

PHILADELPHIA, PA.

JULY 8, 1918.

Considerable interest is still manifest in the metal trades on just how the proclamation of President Wilson regarding the securing of unskilled labor through the Federal Labor Bureau will affect the metal trades. As the majority of the metal firms have government contracts it is believed that they will have less difficulty than at present in securing labor after the order becomes effective. Firms are making arrangements to file a list of the labor in their employ with the Government Labor Bureau and the metal trades believe that this will prevent men from continually changing their places of employment.

A considerably stronger tone was noticeable in the spelter market toward the close of the month. There appeared to be more interest shown in this metal and buying became considerably more active than for some time. Supplies are reported as being light. The trade reports that advances in this section recently totalled twenty points and was due to a large extent to higher cost of transportation. Prices are steadily advancing.

Much surprise was evident in the trade over the advance in prices of lead by the American Smelting and Refining Company. This caused a particularly strong market. The trade say that with the producers committee reaching an agreement on prices with the government during the month that it will have a tendency to eliminate speculation for the balance of the war. Supplies are small in most quarters.

A fair demand for tin plate was reported in most quarters of the trade toward the close of the month. Prices are reported as holding at a steady level. There appears to be more interest shown in this metal.

A contract has been awarded by the Hero Manufacturing Company, Adams and Gaul streets, manufacturers of metal specialties, for the erection of a one story steel frame machine shop, 40 by 200 feet, on Stokley street, near Westmoreland street. The Hero Company has a large number of war contracts and it is said that this increased business has made it imperative that additional space be obtained.

Morris Axelrod and David Kramer have entered into partnership for the conduction of a smelting and refining business under the name of the Southwark Smelting and Refining Company at 711-725 South Twelfth street. The new firm has purchased a two-story brick building, 30 by 100 feet, adjoining the present plant of Mr. Axelrod and will equip it for smelting and refining white metals.

Dealers in metal, confident of the justice of the government's action, are satisfied with the increase in freight rates which went into effect on June 25. Twenty-five per cent. is the advance in class and commodity rates, but the rates for specified kinds of first class freight have increased as much as 100 per cent.

Greater use is being made of motor trucks by the local metal trade in hauling goods within a radius of 100 miles. They feel that this means of transportation is a big factor in the quick dispatch of goods, especially at a time when the railroads are so congested.

Advices have been received in the trade that the War Industries Board has established a new price for aluminum at 33 cents a pound, f. o. b. producing plant, for fifty tons and over for ingots of 98 to 99 per cent. which will remain effective until September 1.

Dealers report that the prices of antimony remain firm and there is little demand noticeable.—F. W. C.

TRENTON, N. J.

JULY 8, 1918.

The metal industries of Trenton are experiencing the same old trouble of trying to secure experienced hands to take the places of those who have been called into the service of their country. The drain made upon the manufacturing plants of this city in the call of experienced men to the colors has had serious effect, and matters are expected to become worse instead of better as the draft continues. The plants are very busy and the important work must be turned out. Concerns are compelled to hire inexperienced help and, of course, it requires some time for the men to become "broken in." When the skilled hands return at the close of the war the work in the shops will appear new to them for some time to come and this will naturally delay matters. There have been no labor troubles during the past month and the manufacturers do not want any. The plants will not tolerate any labor walkouts. The men know that if a serious strike occurs where government work is being turned out that they will be compelled to return to work. The prevailing wage is very good at the metal industry plants and it is not believed that there will be any labor disputes for some time.

The J. L. Mott Company adopted a wise plan following a strike of young munition workers some time ago. Many young men were receiving good wages, but insisted upon being paid higher pay. They were discharged immediately and the big concern got busy and secured young women to take their places. Some of the young women were placed at work in the assembling department while others were instructed in the art of running lathes. The company then gradually placed young women at work in the other departments and the female help is fast taking the place of the male help. The young women are compelled to wear khaki suits and are paid good wages. The Mott Company is enjoying prosperity to such an extent that it recently granted a ten per cent. raise to all the brass workers and announced that another increase in wages would be given soon.

The Skillman Hardware Manufacturing Company recently granted an increase in pay to their moulders. At the plant of the DeLaval Steam Turbine Company, where government work is being turned out, young women are being taught the trade of machinists. Five have already been placed at work on lathes and have proven a big success. The company is very busy and has been short handed for a long time. The concern advertised repeatedly in New York and Philadelphia publications, but were unable to secure the required number of machine hands needed and were compelled to resort to hiring young women. It is probable that the young women will be given permanent positions if they continue to make good.

The metal producing plants of Trenton did their share towards the last Red Cross drive, several of them being announced in the 100 per cent. class, which entitles them to industrial honor flags. Employees of the J. L. Mott Company contributed liberally. The Mott employees also subscribed $60,000 for the last Liberty Loan bonds. There are 1,300 employees at the plant and of this number 1,170 subscribed, placing the works in the 90 per cent. class.

William L. Carmody and Joseph Connors, employees of the J. L. Mott Company, were recently tendered a reception by the employees of the brass department in honor of their leaving to do their bit for the United States. Carmody was presented with a wrist watch, while Connors received a purse of gold.

The Westinghouse Mazda Lamp Company has received an order from the government prohibiting any but employees from entering the big plant or its premises. Because of this order the company's Red Cross workrooms can no longer be used by outsiders who were aiding the Westinghouse employees.

Fire recently caused a loss of about $5,000 at the plant of the Mercer Automobile Company. The blaze started on the third floor of the finishing department and ruined several metal auto bodies besides burning out the room.

The Hoople Corporation, of Hackensack, N. J., has been incorporated in Trenton with a capital stock of $30,000, to manufacture and deal in metal polish. The incorporators are: J. J. Mason, and Walter Anderson, of New York, and F. E. Bliss, of Upper Montclair, N. J.

Ralph Harvey Hulse, who was for some time assistant general manager of the Ingersoll-Trenton Watch Company, has resigned his position to become associated with the Petry Express & Storage Company. His associates at the watch factory presented him with a diamond pin upon the occasion of his retirement from that concern.

The Interstate Smelting and Refining Company, of Newark, N. J., has been incorporated with $100,000 capital to smelt and refine ores. The incorporators are: I. D. Cohen, F. E. Wuerasch and A. A. Blacker, of Newark.—C. A. L.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Bunting Brass & Bronze Company, Toledo, Ohio, which operates a bronze foundry and brass machine shop is erecting a new foundry building.

The Jones-Hernandez Machine & Foundry Company, Birmingham, Ala., is considering the construction of a new foundry, but at the present time is unable to give any definite information.

The John Trageser Steam Copper Works, 447 West 26th street, New York, manufacturer of galvanized boilers and copper specialties, has acquired the building at 459 West 26th street as an extension.

The Central Plating Company, 10 Oliver street, Newark, N. J., has been organized by Max Ruhlmann, and will operate the following departments: Grinding room, galvanizing, plating, polishing and lacquering.

C. F. Verzier, Room 37, 115 Nassau street, New York, expert hard and silver solderer for the trade, announces that he is making a specialty of military work and is prepared to handle quantity orders in this line.

The Abbott Ball Company, Hartford, Conn., manufacturers of polishing, buffing and burnishing machinery, has been incorporated with an authorized capital of $500,000 by George E. Abbott, Charles H. Abbott and Arthur L. Shipmen.

The Mains Foundry Company, Jacksonville, Fla., is rebuilding its main foundry, which was recently damaged by fire. The new foundry building will be 35 x 90 feet, and will be equipped for the production of iron and brass castings.

The Worcester Stamped Metal Company, 9 Hunt street, Worcester, Mass., is building an addition to its tool department and press shop, which will increase the manufacturing space about 8,000 square feet, and will cost about $10,000.

The Doehler Die Castings Company, Toledo, Ohio, has acquired the two-story building, 60 x 240 feet, belonging to the Ohio Electric Car Company, and will fit it up as a machine shop for machining hand grenades and rifles and other war equipment.

The Brady Brass Company, 170 Fourteenth street, Jersey City, N. J., will build an addition to cost about $20,000. A brass and bronze foundry, brass machine shop, grinding room and casting shop are among the departments operated by this company.

The Ideal Bronze Company, 1265 East 55th street, Cleveland, Ohio, has awarded the contract for the construction of a one-story, 60 x 70 feet addition to its foundry at an estimated cost of $10,000. The company operates a brass, bronze and aluminum foundry and casting shop.

The Metal Parts Manufacturing Company, Cleveland, Ohio, has taken over the building at 1044 East 152nd street, containing about 36,000 square feet of space, and which had been occupied by the Dann Products Company. The Metal Parts Company has leased back to the Dann Company about one-third of the space.

The A. Gilbert & Sons Brass Foundry, St. Louis, Mo., is remodeling and enlarging its brass foundry and is adding new equipment which will cost about $10,000. The company operates a smelting and refining department, brass, bronze and aluminum foundry, brass machine shop, tool and grinding room and casting shop.

The Cleveland Blow Pipe & Manufacturing Company, Cleveland, Ohio, has moved its factory from 6302 Kinsman Road to a large one at 6950 Kinsman Road, where it has increased facilities in machines and space for giving efficient service for manufacturing and installing dust collecting systems for all classes of dust producing machinery.

The Lincoln Way Brass Foundry Company, South Bend, Ind., owned by S. P. Stults, is being incorporated for $18,000. Mr. Stults has taken into the company C. H. Johnson and Charles C. Heckathorn. The company now operates a brass, bronze and aluminum foundry, grinding room and casting shop, but expects to enlarge its facilities in the near future.

The Franklin Manufacturing Company, 105-7 Franklin street, Jersey City, N. J., has filed notice of organization to manufacture metal goods, although the company is an old established concern. The company states that it may have need for supplies used in the following departments: Brass machine shop, tool and grinding room, stamping and plating departments.

The Precision Castings Company, of Syracuse, N. Y., will immediately rebuild its foundry at Pontiac, Mich., which was burned on May 26 with a loss of $50,000. The melting room was completely destroyed and the molding room badly damaged, together with about $30,000 worth of patterns for Government work. The plant has been engaged in the manufacture of castings for naval guns.

The old plant of the Cleveland Pneumatic Tool Company, on Hawthorne avenue, Cleveland, Ohio, has been acquired by the **Buckeye Brass & Manufacturing Company.** The Buckeye Company contemplates moving into the new quarters shortly, which will provide for considerable increase in manufacturing facilities. The company operates a brass and bronze foundry, brass machine shop and tool grinding room.

Walter E. Bush, 109 Highland Ave., Jersey City, N. J., has recently been appointed United States buyer for one of the largest importing corporations in Australia. If any of our readers are not now represented in that market, and if your goods are manufactured by, and your firm is composed of non-enemy aliens, a large amount of business might be secured for that field, which at this time is more than ever looking for goods of American manufacture, by corresponding with Mr. Bush.

The Ulfers-Holtum Manufacturing Company, of Freeport, Ill., has recently made extensive additions to its machine shop department, and is now better equipped than ever before to live up to its business slogan, "quick and complete service." This company has executed several Government contracts, and in addition to the manufacture of its regular lines, consisting of cement workers' tools, kerosene vapor burning lamps, anti-skidding devices, etc., it operates for jobbing purposes a brass, bronze and aluminum foundry, machine shop, tool and grinding rooms, and plating and polishing departments.

A new plan of wage payment that has recently gone into effect at the **Stamford Rolling Mills Company,** Springdale, Conn., is as follows: The eight-hour day is the basis upon which the process rests, and time and a half is paid for all time over eight hours in any one day. In addition to this, all employees who have been constantly in the employ of the company for three months or over are given a ten per cent. bonus. This bonus is paid monthly in a separate envelope. As the company at the present time is working ten hours a day, the new wage payment means an advance of practically ten per cent. to every employee in the plant. In addition to the above, the company has raised its minimum rate for unskilled laborers, as well as making several other changes in rates of various operations throughout the plant.

The National Brass Works, Inc., Sacramento and Wilson streets, Los Angeles, Cal., recently incorporated with a capital stock of $50,000, has elected the following officers: H. L. Hartman, president; W. W. Witherby, vice-president, and Leonard Ruegg, secretary and treasurer. Improvements on the company's building costing $10,000 will give an additional floor space of 15,000 square feet, and new machinery costing $10,000 has just been installed. The company specializes in brass, bronze, zinc, bell metal, aluminum and gun metal

products, and a complete finishing and plating department is operated in connection with the foundry. Leonard Ruegg, secretary, announces that contracts for specialty work have been received, the total of which is sufficient to keep the entire plant busy for the next three years.

Ground has just been broken for the new addition to the **Doehler Die-Casting Company's** Brooklyn, N. Y., factory on Court and Huntington streets. This addition will cover 150 feet on Court street and 200 feet on Huntington street, and will be ten stories high; actually doubling the present capacity of the plant. Construction will be of steel and concrete throughout, to conform to the general character of their present massive structures, the last addition to which was completed and has only been occupied since September 1.

Newly perfected types of automatic die-casting machinery are now in process of construction, ready to be installed in the new building, which is to be ready for occupancy before the summer is over. While the greater portion of the company's activities are devoted to Government and war work, the requirements of the regular trade, which in the main is now also for Government war consumption, are receiving the usual attention.

INCREASE IN CAPITAL STOCK

The General Castings Corporation, Auburn avenue, Buffalo, N. Y., John Klein, president, has increased its capital stock to $50,000.

BUSINESS TROUBLES

Alfred Aarons, in behalf of the Creditors' Committee in the matter of the **Philadelphia Brass Company,** Philadelphia, Pa., has made application to the courts for liquidation which will take the form of bankruptcy of the above mentioned concern. Application has also been made for the appointment of a receiver to liquidate the assets of the company to the best possible advantage and the committee has decided to recommend to the court for appointment as receiver, Philip E. Stoever.

REMOVALS

Paul Wenger Company have moved their offices to 56-58 Liberty Street and 35 Nassau Street, New York, where their facilities for handling orders for their 5%, 10% and 15% phosphor copper are better than ever.

The Aspromet Company, of Pittsburgh, Pa., formerly the Asbestos Protected Metal Company, announces that it removed its Chicago office on July 1 to the Railway Exchange Building. J. T. O'Neil will continue in charge as district manager.

FOREIGN TRADE OPPORTUNITIES

For addresses of these inquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file numbers.

26949—A wholesale and retail jeweler in Peru is in the market for electroplated, gold-filled, and gold jewelry in 10 carat and 18 carat; also silverware, tools, materials, and jewelry novelties. References.

26885—A man in Australia wishes to secure an agency for the sale of copper, brass, white metal, german silver, nickel and phosphor sheathing bronze sheets and plates, wire, tubes, bars, rods, condenser tubes, engravers' brass, etc. Cold rolled sheets should be bright and free from scale. Tubes must be true at both ends. Payment will be made by cash against documents. References.

27146*—A man in England would like to secure an agency for the sale of cutlery, hardware, enamel ware, galvanized iron, etc. Quotations may be made f. o. b. New York. Payment will be made by cash against documents. Reference.

PRINTED MATTER

Waste Water Evaporators—The first booklet relating to the Lillie Evaporator published by the Wheeler Condenser & Engineering Company, Carteret, N. J., has just been published. The Lillie Evaporator is now manufactured exclusively by this company under agreement with the Sugar Apparatus Manufacturing Company—S. Morris Lillie, president—owners of the Lillie patents.

Metal Hose and Tubing—The Metal Hose and Tubing Company, Brooklyn, N. Y., has issued some new literature concerning metal hose and tubing. This literature describes the many forms of hose as manufactured by this company, and in this connection the Bureau of Standards, Department of Commerce, Washington, D. C., in a recent report, comments favorably on the company's gasoline tubing used for conveying gasoline. Copies of this little booklet may be had upon request.

Safe Practices.—Bulletins, 8, 9 and 10 have been issued by the National Safety Council of Chicago, Ill. These bulletins are orderly presentations in loose-leaf form of accident hazards and the best practices for their elimination. Bulletin 8 is devoted to Shafting, Couplings, Pulleys, Gearing for Transmission Machinery. Bulletin 9 is concerned with Engine Guarding and Engine Stops, while Bulletin 10 is taken up with descriptions of Oiling Devices and Oilers and the safety practices connected with their use.

Computing Instrument—The Computer Manufacturing Company, San Francisco, Cal., describes in a twelve-leaf folder the merits of a remarkable little device known as the Ross rapid computer. Almost human in its facilities for computations, the machine includes among its possibilities, multiplying, dividing, the handling of constant multipliers, divisors, dividends and raratios, and also gives trigonometric functions, without requiring to take 90-degree angles or reciprocals. Further information relating to this computer may be had by corresponding with the company.

Minerals—The Mineral Foote-Notes for June, the interesting little monthly which is devoted to semi-rare ores and their products, published by the Foote Mineral Company, Philadelphia, Pa., is concerned with "Manganese, Its Occurrence and Commercial Uses." This article has been prepared by Thomas L. Watson and covers the subject of manganese in all its phases, from the location of the ore to the uses of the finished product. It is also announced that "Mineral Foote-Notes," owing to the conditions surrounding the publishing trade, will be published as a bi-monthly, but that subscribers will receive their full number of copies.

Sand Blast Machinery—The line of sand blast machinery built by the J. W. Paxson Company, Philadelphia, Pa., is illustrated and described in a well prepared booklet of forty odd pages. The line of machinery included in the description in the bulletin consists of the Paxson-Warren sand blast machines, horizontal and oblique tilting sand blast tumbling barrels, cleaning cabinets, sand sifters, dryers and various other sand handling machinery, and a complete list of accessories, together with the best ventilated down draft steel sand blast room. All of the materials described in the bulletin are manufactured by the Paxson company at their shops.

"Copper."—A new publication of the Bureau of Standards, Circular Number 73, has been issued. This circular deals primarily with the physical properties of pure and of commercial grades of copper. The best data and values are given for the various physical characteristics and constants, together with a bibliography of the sources from which these values were taken. The effect of impurities upon the properties of copper is discussed, as well as the influence of various factors in its manufacture. This paper is now ready for distribution, and those interested may obtain a copy by addressing a request to the Bureau of Standards, Washington, D. C.

Re-education of War Victims—The Federal Board of Vocational Education, at Washington, D. C., has issued Bulletin No. 15, which gives a complete description of the evolution of national systems of vocational re-education for disabled soldiers and sailors. The bulletin has been edited by Douglas C. McMurtrie and was prepared at the Red Cross Institute for Crippled and Disabled Men. The bulletin, which gives a wonderful account of the work being done by the belligerent countries for the re-education of the victims of the war, is probably the most complete account available of the experiences of these countries in the work of rehabilitation. Copies of this report may be had by corresponding with the Federal Board.

Fire Appliances.—The Pyrene Manufacturing Company, New York, has issued catalog No. 2, 1918, of Fire Appliances. The catalog, which contains 144 pages, has a fore-word from William Guerin, Chief of the Bureau of Fire Prevention of New York City and also Chief of the Engineering Bureau of the Pyrene Manufacturing Company, who states that every product listed in the catalog has been inspected and approved by him. The list of products produced by this company include, Pyrene fire extinguishers, Guardene-Champion chemical fire engines, Guardene fire bucket tanks, cans and pails. A great variety of fire prevention and danger signs, portable fire escapes, nozzles, play pipes, relief valves and a multitude of other products used not only for the prevention but also for the extinguishing of fires. Copies of this interesting publication may be had upon request.

Crucibles—The Jonathan Bartley Crucible Company, Trenton, N. J., has issued a handsomely gotten up catalog on the subject of graphite crucibles for foundry practice. The catalog contains excellent half-tones of all of the various shapes and sizes of crucibles manufactured by this company, and also photographs of their factories. The text includes descriptions of the various crucibles, together with instructions for the care and use of graphite crucibles. The catalog contains several pages of Foundry Notes and Formulæ which were prepared by Frank Zeller, superintendent of the brass foundry, Jarecki Manufacturing Company, Erie, Pa., for THE METAL INDUSTRY. There is also a chapter devoted to graphite, what it is and where it comes from, and how it is prepared for use in the manufacture of crucibles. The catalog concludes with the reproduction of an editorial from THE METAL INDUSTRY on "Crucible Justice."

Sheet Metal Workers—The Peck, Stow & Wilcox Company, Southington, Conn., has recently issued two valuable books on the above subject, the first of these "A Course of Elementary and Advanced Sheet Metal Work and Pattern Drafting," by J. S. Dougherty, was written especially for teachers and students in order that they might easily supplement their previous knowledge with more expert information, while the machinery and tool dealers will find the book of practical value to them. This book may be obtained for $1.50, postage prepaid.

The second work is **"Sheet Workers' Manual."** This book contains fifteen chapters, which give authentic information for all classes of trade, i. e., sheet metal workers, apprentices, manufacturers, purchasing agents, trade school instructors, and students, and is illustrated with more than four hundred pen drawings, as well as other illustrations. This book may be had at a price of $2, postage prepaid.

FIXED PRICES FOR ACIDS

WASHINGTON, June 27.—The War Industries Board announced today that, as a result of a meeting of the manufacturers of sulphuric and nitric acid with the Price-fixing Committee of the War Industries Board, maximum prices have been agreed upon and approved by the President, taking effect immediately, and expiring September 30, 1918, as follows:

Sulphuric acid 60 degrees Baumé, $18 a ton of 2,000 pounds.

Sulphuric acid 66 degrees Baumé, $28 a ton of 2,000 pounds.

Sulphuric acid 20 per cent. oleum, $32 a ton of 2,000 pounds.

Free on board at manufacturers' works in seller's tank cars.

In carboys in carload lots, one-half cent a pound extra.

In carboys in less than carloads, three-quarters of a cent a pound extra.

In drums, any quantity, one-quarter cent a pound extra.

Nitric acid 42 degrees Baumé, eight and one-half cents a pound, free on board manufacturers' workers in carboys.

A schedule of maximum prices on mixed schedules acid is being prepared, and will be announced later. The above maximum prices are agreed upon for the public as well as the Government. It is understood and agreed that any deliveries made after September 30 will be subject to any revision in price which the Government may make.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL STOCKS MARKET QUOTATIONS

NEW YORK, July 8, 1918.

	Par	Bid	Asked
Aluminum Company of America	$100	500	600
American Brass	100	220	226
American Hardware Corp.	100	124	129
Bristol Brass	25	38	42
Canadian Car & Foundry, com.	100	28	32
Canadian Car & Foundry, pfd.	100	71	75
Eagle Lock	25	70	75
International Silver, com.	100	40	50
International Silver, pfd.	100	..	78
New Jersey Zinc	100	228	232
Rome Brass & Copper	100	310	40
Scovill Manufacturing	100	455	465
Standard Screw, com.	100	270	80
Standard Screw, "A" pfd.	100	100	..
Yale & Towne Mfg. Co.	100	190	200

Corrected by J. K. Rice, Jr., & Co., 36 Wall street, New York.

APPROVES COPPER PRICE

President Wilson approved on July 3, 1918, the agreement between copper producers and the War Industries Board, fixing the maximum price on copper at 26 cents a pound, an advance of 2½ cents over the former price. The new price, which became effective yesterday, is subject to revision after next August 15.

The conditions on which the price increase was granted were announced by the board as follows:

That producers will not reduce the wages now being paid; that they will sell to the United States Government, the public and to the Allied governments at not above the maximum prices; that they will take the necessary measures, under the direction of the War Industries Board, for the distribution of copper to prevent it from falling into the hands of speculators who might increase the price to the public, and that they will pledge themselves to exert every effort necessary to keep up production so as to insure an adequate supply during the war.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

JULY 8, 1918.

COPPER

The agitation for a higher price on copper than 23.50c. per pound established by the Government in September, 1917, continued and in view of the higher freight rates, the increasing shortage of labor and huge Government requirements, now estimated at fully 90 per cent of entire output, is winning new advocates. The Copper Producers Committee is allotting orders for domestic consumption with great reserve because of the Government's need of the metal. Another conference between the War Industries Board and the copper producers is to be held August 7th when all data will have been considered and the price question again will be taken up for settlement. Consuming demand is heavy and refined production is increasing but smelter production is reported to have fallen off somewhat in May because of the lack of labor.

Exports of copper in May were 28,889 tons exclusive of shipments to Canada, the figures for which are not yet available. Importations during May, were 9,370 tons of ore, 915 tons of matte and 9,640 tons of copper.

TIN.

Following the decline in prices which began in May and continued through much of June, transactions in the tin market were greatly reduced, consumers having assumed a waiting attitude in expectation of even lower prices because of the easier feeling in view of the fact that arrivals were coming in regularly in large quantities at Pacific ports and in small quantities at Atlantic ports. Conflicting interpretations as to the 25 per cent advance in freight rates in its application to tin also acted as a deterrent influence upon buying. The understanding at the close of the month was that the advance would amount to $1.25 per cwt. on tin from Pacific coast to New York. Spot tin—English Lamb & Flag—in New York in small amounts was held at 90c. per pound until late in the month when an advance to 94-94.50c. per pound was made. Banca tin in lots shortly to arrive at Pacific ports was held at 90c. per pound. Straits metal for August-September shipment from the East Indies was around 81.50c. per pound, no spot metal being available.

June arrivals at Atlantic ports were 730 tons and at Pacific ports 5,874 tons making a total of 4,795 tons. Afloat were 5,050 tons. Reductions from Bolivian ore in the U. S. in May amounted to 2,407 tons making a total of 5,122 for first five months 1918 as compared with 1,672 tons in the corresponding period 1917.

LEAD.

With scarcity of prompt and nearby metal in June, combined with heavy Government buying, the lead market advanced from 7.15-7.35c. New York, 7.00-7.10c. East St. Louis to 8.05c. New York, 7.75c. East St. Louis not only in the outside market but also in the official base price of the American Smelting & Refining Co., which was a rise of 90 points per pound. The advance in freight rates necessitating readjustment to the new schedule was in process of settlement at the close with sellers very reserved under active demand and 7.90c. per pound quoted as being merely nominal. Lead ore advanced from $85 per ton to $97.

Exports of lead in May were 6,413 tons, while arrivals at the port of New York were 540 tons. Receipts of base bullion and ore from Mexico and England amounted to 2,055 tons.

SPELTER.

The spelter market in June, continued to develop in strength and firmness with rising prices that registered a total and also a net advance of 1.35c. per pound during the month from 7.45-7.50c. New York, 7.25-7.30c. East St. Louis at the beginning, to 8.80-8.90c. New York, 8.55-8.65c. East St. Louis, at the close. The statistical position was greatly improved by the better balance established between supply and demand through the reduction in stocks and the decrease in output. Future positions throughout the month were held at a premium over prompt metal and ore prices were stationary at $75 per ton for high grade, other grades ranging according to quality from $40 to $55 per ton. Uncertainty concerning freight rates was a source of confusion and restricted trade but was in a fair way to final adjustment at the close.

Exports during May from all ports were 5,997 tons equivalent to 13,332,280 pounds.

ALUMINUM.

The aluminum market in June was under full control of the Government with the maximum base price established at 33c. per pound for metal 98-99 per cent pure, f. o. b. producing plant in lots of 50 tons or more. For lots of 15 to 50 tons 33.10c. per pound and for lots of 1 to 14 tons 33.20c. Scrap aluminum is now based upon the same schedule and all prices remain effective until September 1.

ANTIMONY.

After a week of dullness in June at May closing prices, considerable activity was developed with prices advanced 1c. per pound to 13.25c. New York duty paid, by the end of the third week and by which time two Government orders had been placed in addition to the regular buying. During the final week, there was a falling off in business transacted with a discussion as to the advisability of a higher duty being placed upon importations.

The result was a recession in prices to 13.00c. but with the expectation of renewed buying for manufacture of shrapnel, the market was firm.

Importations at the port of New York amounted to 590 tons including ore from Chili and metal from China and Japan.

SILVER

The price of silver throughout June was unchanged from the May closing, 99½c. per fine ounce, and which has been in force since May 2.

QUICKSILVER

With a maximum base for quicksilver established for Government buying at $105 per flask of 75 pounds, the prices to other buyers are limited to a maximum of $135-$140 per flask. During June, the fluctuation was narrow, the opening price, $115-$120 advancing to $118-$120 by the 5th, after which no change occurred.

PLATINUM.

With maximum prices established at $105 per Troy ounce for pure and at $175 per ounce for iridium, the market in June was under full control of the Government which has commandeered the nation's entire supply for the duration of the war.

OLD METALS

The old metals market in June was fairly active with a satisfactory volume of business transacted. Lead and type scrap, bell metal and zinc as well as aluminum scrap were in constant demand. Prices advanced ¼c. per pound on brass turnings and on tea lead to 12.75c. for the former and to 5.75c. for the latter. Old cast aluminum rose 1c. to 23c., old sheet aluminum ½c. to 24c. per pound. Old zinc and electrotype advanced ¾c. to 6.25c. for zinc and to 7.25c for electrotype. Uncrucibled copper wire dropped 1c. to 20.50c. per pound. No. 1 composition turnings and scrap ½c. to 18.50c. for turnings and to 21.00c. for scrap while No. 1 brass clippings lost ¾c. and No. 1 brass turnings gained the same amount, the former closing at 14.75c., the latter at 12.75c.

WATERBURY AVERAGE

Lake Copper. Average for 1917—30.97. 1918—January, 23.50. February, 23.50. March, 23.50. April, 23.50. May, 23.50. June, 23.50.

Brass Mill Spelter. Average for 1917—11.116. 1918—January, 9.60. February, 9.60. March, 9.40. April, 8.50. May, 8.95. June, 9.50.

JUNE MOVEMENT IN METALS

	Highest	Lowest	Average
COPPER:			
Lake	*23.50	*23.50	*23.50
Electrolytic	*23.50	*23.50	*23.50
Casting	*23.50	*23.50	*23.50
TIN	Market nominal; no metal offering		
LEAD	8.00	7.15	‡7.562
SPELTER (Brass special)	9.00	7.50	8.079
ANTIMONY	13.37½	12.00	12.994
ALUMINUM	†33.10	†33.10	†33.10
QUICKSILVER (per flask)	$120.00	$115.00	$118.85
SILVER (cts. per oz.)	99½	99½	99½

*Government price. †Government price for carload lots effective June 1. ‡Average of quotations from June 1 to 18, inclusive; market nominal thereafter.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

Metal Prices, July 8, 1918

NEW METALS

COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.		
Electrolytic, carload lots, nom.	Government price.	26
Lake, carload lots, nominal...	Government price.	26
Casting, carload lots, nominal		26
TIN—Duty Free.		
Straits of Malacca, carload lots		none offered
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots		8.05
SPELTER—Duty 15%.		
Brass Special		9.00
Prime Western, carload lots		8.95
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.		
Small lots, f. o. b. factory		....
100-lb., f. o. b. factory		....
Ton lots, f. o. b. factory	Government price.	33.10
ANTIMONY—Duty 10%.		
Cookson's, Hallet's or American		Nominal
Chinese, Japanese, Wah Chang WCC, brand spot		13⅛
NICKEL—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.		
Shot or Ingots		40 to 43c.
ELECTROLYTIC—5 cents per pound extra.		
MANGANESE METAL		Nominal
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)		$2.00
BISMUTH—Duty free		3.60
CADIUM—Duty free	nominal	1.75
CHROMIUM METAL—Duty free		.75
COBALT—97% pure		3.00
QUICKSILVER—Duty 10% per flask of 75 pounds		$125.00
PLATINUM—Duty free, per ounce		105.00
SILVER—Government assay—Duty free, per ounce		.99⅝
GOLD—Duty free, per ounce		20.67

INGOT METALS

Silicon Copper, 10%	according to quality	50	to55
Silicon Copper, 20%	" "	50	to55
Phosphor Copper, guaranteed 15%	" "	57	to62
Phosphor Copper, guaranteed 10%	" "	55	to60
Manganese Copper, 30%, 2% Iron	" "	65	to72
Phosphor Tin, guaranteed, 5%	" "	1.25	to1.30
Phosphor Tin, no guarantee	" "	1.10	to1.15
Brass Ingot, Yellow	" "	17	to19
Brass Ingot, Red	" "	25	to26
Bronze Ingot	" "	24½	to25½
Parsons Manganese Bronze Ingots	" "	30½	to32
Manganese Bronze Castings	" "	40	to50
Manganese Bronze Ingots	" "	26	to30
Phosphor Bronze	" "	24	to30
Casting Aluminum Alloys	" "	38	to39

OLD METALS

Buying Prices.	Selling Prices.
24.00 Heavy Cut Copper	25.50
24.00 Copper Wire	25.50
21.00 Light Copper	23.00
23.00 Heavy Mach. Comp	25.50
15.50 Heavy Brass	17.50
12.00 Light Brass	14.00
13.25 No. 1 Yellow Brass Turning	14.25
20.00 No. 1 Comp. Turnings	23.00
7.00 Heavy Lead	7.25
5.25 Zinc Scrap	5.70
10.00 to 13.00 Scrap Aluminum Turnings	11.00 to 14.00
19.00 to 21.50 Scrap Aluminum, cast alloyed	21.00 to 23.00
26.00 to 28.00 Scrap Aluminum, sheet (new)	28.00 to 30.00
55.00 No. 1 Pewter	60.00
22.00 to 23.00 Old Nickel anodes	25.00 to 26.00
30.00 to 32.00 Old Nickel	34.00 to 36.00

PRICES OF COPPER SHEET

Mill shipments (hot rolled) ..... 36c. base net
From stock ..... 38c. base net

The following table shows the advance in cents per pound over the base price of copper sheet of various grades, lengths and widths.

SIZE OF SHEETS.		CENTS PER LB.				CENTS PER LB. OVER BASE.				
		64 oz. and over.	32 oz. to 64 oz.	24 oz. to 32 oz.	16 oz. to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
Width.	LENGTH.									
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							
	Longer than 120 ins.	5	8							
Wider than 120 ins., but not wider than 132 ins.	Not longer than 132 ins.	6	9							
	Longer than 132 ins.	7								
Wider than 132 ins.		8								

[The insert shows the extras on copper sheets from 10, 9, 8 and less than 8 oz. in weight, and various lengths and widths.]

Width.	LENGTH.	Light than 8 oz.	8 oz.	9 oz.	10 oz.
Not wider than 30 ins.	Not longer than 72 inches.	9			3
	Longer than 72 inches. Not longer than 96 inches.		6	4½	6
	Not longer than 72 inches.		9	7½	
Wider than 30 ins., but not wider than 36 ins.	Longer than 72 inches. Not longer than 96 inches.				
Wider than 36 ins., but not wider than 48 ins.	Not longer than 72 inches.				

The longest dimension in any sheet shall be considered as its length.

Metal Prices, July 8, 1918

Extras for Copper Sheets.

Circles, 8 in. diameter and larger, segments and pattern sheets, advance per pound over prices of sheet copper required to cut them from..... 3c.

Circles less than 8 in. in diameter, advance per pound over prices of sheet copper required to cut them from..... 2c.

Cold or hard rolled copper, 14 oz. per square foot and heavier, advance per pound over foregoing prices..... 1c.

Cold or hard rolled copper, lighter than 14 oz. per square foot, advance per pound over foregoing prices..... 2c.

Cold rolled annealed copper, the same price as cold rolled copper.

All polished copper, 20 in. wide and under, advance per square foot over the price of cold rolled copper..... 1c.

All polished copper, over 20 in. wide, advance per square foot over the price of cold rolled copper..... 2c.

For polishing both sides, double the above price.

The polishing extra for circles and segments to be charged on the full size of the sheet from which they are cut.

Cold rolled copper, prepared suitable for polishing, same prices and extras as polished copper.

All planished copper, advance per square foot over the prices for polished copper ..... 1c.

Tinning.

Tinning sheets on one side, all sizes, per square foot.... 5c.

For tinning both sides double the above price.

Extra for tinning or polishing circles and segments, to be charged on the full size of the sheet from which they are cut.

For tinning edges of sheets, one or both sides, prices shall be the same as for tinning all of one side of the specified sheet.

Oval Copper Bottoms.

Tinned One Side.

16 oz. to square foot and heavier, per pound.....Base
15 oz. to square foot per lb., advance over base..... ½c.
14 " " " " " " " " " " .....1c.
13 " " " " " " " " " " .....1½c.
12 " " " " " " " " " " .....2c.
11 " " " " " " " " " " .....3c.
10 " " " " " " " " " " .....4c.
Lighter than 10 oz. to square foot, per pound .....7c.

Round copper bottoms, tinned one side, 8 in. **(203.2)** diameter to 17 in. **(431.8)** diameter, both inclusive, 1c. per lb. advance over ovals.

Copper circles, tinned one side, less than 8 in. **(203.2)** diameter, 3c. per lb. additional.

Copper circles, tinned one side, over 17 in. **(431.8)** diameter, not classed as copper bottoms.

Polished oval and round tinned copper bottoms, same advance as for sheets.

Copper Anodes or Battery Plates Not Larger Than 20 x 30.
⅜ in. **(9.5)** and thicker, untrimmed..... lb.
⅜ in **(9.5)** and thicker, trimmed to size..... lb.

If drilled, full weight before drilling to be charged.

Nickel-Plated Copper.

Net Cash Prices.

Sheets 14 x 48 **(355.6 x 1219.2)** inches.

	Advance over base per lb.	Plating per sheet
14 and 16 oz. and heavier, by the case of 500 pounds and over.....	6c.	40c.
14 and 16 oz. and heavier, less than one case	7c.	42c.
12 oz. and lighter, by the case.....	8c.	40c.
12 oz. and lighter, less than one case.....	9c.	42c.

Boiler Sizes.

Over 12 (.40) Oz.

By the case of 500 lbs., 7 in **(177.8)** (14 x 52) **(355.6 x 1320.8)**	6c.	45c.
By the case of 500 lbs., 8 in. **(203.2)** (14 x 56) **(355.6 x 1422.4)**	6c.	45c.
By the case of 500 lbs., 9 in. **(227.6)** (14 x 60) **(355.6 x 1523.6)**	6c.	50c.

For less quantity than one case, add 2c. per lb.; 12 oz. and lighter, add 3c. per lb.

Tinning.

For copper nickel plated on one side and tinned on the other, add for
All sizes, per square foot.....3½c.

Note.—The figures in heavy face type in all cases represent metric measurements.

BARE COPPER WIRE—CARLOAD LOTS

29c. per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order.....40c. per lb. base
100 lbs. to 300 lbs. in one order.....41c. " " "
Less than 100 lbs. in one order.....42½c. " " "

SEAMLESS COPPER TUBING

41 to 44c. per lb. base.

BRASS MATERIAL—MILL SHIPMENTS

In effect January 3, 1918.

To customers who buy 5,000 lbs. or more per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.30	$0.33	$0.36
Wire	.30	.34	.37
Rod	.28	.34	.37
Brazed tubing	.38	..	.44
Open seam tubing	.38	..	.44
Angles and channels.....	.43	..	.48

To customers who buy less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.31½	$0.35	$0.38
Wire	.31½	.36	.39
Rod	.30	.36	.39
Brazed tubing	.40	..	.46
Open seam tubing.....	.40	..	.46
Angles and channels.....	.45	..	.50

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

SEAMLESS BRASS TUBING

37½ to 40½c. base.

SEAMLESS BRASS TUBING—IRON PIPE SIZES

37½ to 40½c. base.

IRON LINED TUBING—NOT POLISHED

Due to fluctuations of the metal market we are unable to quote these prices.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod.....35½c. net base
Muntz or Yellow Metal Sheathing (14" x 48").32c. " "
Muntz or Yellow Metal Rectangular sheets other than Sheathing.....35c. " "
Muntz or Yellow Metal Rod.....33c. " "
Above are for 100 lbs. or more in one order.

Metal Prices, July 8, 1918

ZINC SHEET

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 15c. basis, less 8%

Casks, jobbers' prices....16½c.

Open casks, jobbers' prices....17c.

The above mill prices have been fixed by the United States Government, applying to civilian population of the United States and allied governments.

ALUMINUM SHEET, ROD AND WIRE

Sheet Aluminum, outside market contract base price, 42.40c. per pound.

FLAT SHEET

Gauge		Price in Cents per Lb. 1 Ton Lots	15 Ton Lots	50 Ton Lots
Nos. 18 and heavier	3" to 60"	42.40	42.20	42.00
Nos. 19 and 20	3" to 60"	43.50	43.30	43.10
Nos. 21 to 24, incl.	3" to 30"	45.80	45.60	45.40
	30" to 48"	48.00	47.80	47.60
	48" to 60"	51.40	51.20	51.00
Nos. 25 and 26	3" to 30"	49.20	49.00	48.80
	30" to 48"	51.40	51.20	51.00
No. 27	3" to 30"	50.30	50.10	49.90
	30" to 48"	53.70	53.50	53.30
No. 28	3" to 30"	52.50	52.30	52.10
	30" to 48"	55.90	55.70	55.50
No. 29	3" to 30"	55.90	55.70	55.50
	30" to 48"	60.40	60.20	60.00
No. 30	3" to 30"	58.20	58.00	57.80

ROD.

B. & S. Gauge.

¼" to 1" Advancing by 32nds
1" to 2⅜" " " 16ths } 98% rolled, 43.10 cents per lb.
2⅜" to 3½" " " 8ths

⅜" to ¼", 98% rolled and drawn....48.80 cents per lb.

WIRE.

Definition: Round—less than ⅜" diameter. Other shapes—less than ⅜" greatest diameter.

B. & S. Gauge.	Spools.	Price in Cents Per Lb. On Spools.	In Coils.
Nos. 2 to 10, inclusive	50 lb.	$.465	$.437
Nos. 11 and 12	50 lb.	.499	.465
Nos. 13 and 14	35 lb.	.533	.493
Nos. 15 and 16	20 lb.	.611	.549
Nos. 17 and 18	20 lb.	.689	.606
Nos. 19 and 20	10 lb.	.714	.718
No. 21	10 lb.	.815	.803
No. 22	10 lb.	1.050	.915
No. 23	10 lb.	1.185	1.028
No. 24	5 or 2 lb.	1.421	....
No. 25	5 or 2 lb.	1.646	....
No. 26	5 or 2 lb.	1.928	....
No. 27	1 lb.	2.321	....
No. 28	1 lb.	2.771	....
No. 29	½ lb.	3.840	....
No. 30	½ lb.	5.021	....

GRADE "B" NICKEL SILVER SHEET METAL

Quality.	Net per lb.	Quality.	Net per lb.
5%	42½c.	16%	47c.
8%	43½c.	18%	47½c.
10%	43¾c.	20%	49¼c.
12%	45½c.	25%	57c.
15%	49c.	30%	62½c.

NICKEL SILVER WIRE

Quality.	Net per lb.	Quality.	Net per lb.
5%	44c.	15%	52c.
8%	46c.	16%	52½c.
10%	48c.	18%	54½c.
12%	50c.	30%	70c.

The above Base Prices are subject to additions for extras as per list printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are correspondingly higher.

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 12c. over, 25 to 50 lbs., 15c. over, less than 25 lbs., 25c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

LEAD FOIL

Base price—5.75 cents per lb.

TIN FOIL

Base price—No quotation.

PLATERS METALS

Platers' bar in the rough, 65c. net.

Nickel silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at —— above the price of bullion. Manufacturers state that as silver is selling at a premium at the present time they are unable to give any quotation.

NICKEL ANODES

85 to 87% purity....52½c. per lb.
90 to 92% " ....55c. " "
95 to 97% " ....57½c. " "

Supply Prices, July 8, 1918

CHEMICALS

Acid—		
Boric (Boracic) Crystals	lb.	.25
Hydrochloric (Muriatic) Com., 18 deg.	lb.	.08
Hydrochloric, C. P., 22 deg.	lb.	*.16
Hydrofluoric, 30%	lb.	.40
Nitric, 36 deg.	lb.	.09¼
Nitric, 42 deg.	lb.	.11⅛
Sulphuric, 66 deg.	lb.	.08
Alcohol—		
Denatured	gal.	1.00
Alum—		
Lump	lb.	.09
Powdered	lb.	.15
Aluminum sulphate, iron free	lb.	.15
Aluminum chloride solution	lb.	.16
Ammonium—		
Sulphate, tech.	lb.	.10
Sulphocyanide	lb.	—
Arsenic, white	lb.	—
Argols, white, see Cream of Tartar	lb.	.75
Asphaltum	lb.	.35
Benzol, pure	gal.	1.00
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate)	lb.	.15
Calcium Carbonate (Precipitated Chalk)	lb.	.15
Carbon Bisulphide	lb.	.20
Chrome Green	lb.	—
Cobalt Chloride	lb.	—
Copper—		
Acetate (Verdigris)	lb.	—
Carbonate	lb.	.40
Cyanide	lb.	.65
Sulphate	lb.	.17
Copperas (Iron Sulphate)	lb.	.06
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.80
Crocus	lb.	.10
Dextrin	lb.	.25
Emery Flour	lb.	.10
Flint, powdered	ton	—
Fluor-spar (Calcic fluoride)	ton	—
Fusel Oil	gal.	—
Gold Chloride	oz.	12.00
Gum—		
Sandarac	lb.	—
Shellac	lb.	—
Iron Sulphate, see Copperas	lb.	.06
Lead Acetate (Sugar of Lead)	lb.	—
Yellow Oxide (Litharge)	lb.	.20
Mercury Bichloride (Corrosive Sublimate)	lb.	—
Nickel—		
Carbonate, dry	lb.	.80
Chloride	lb.	.70
Salts, single bbl.	lb.	.14
Salts, double bbl.	lb.	.13
Paraffin	lb.	.25
Phosphorus—Duty free, according to quality		75-100
Potash, Caustic (Potassium Hydrate)	lb.	—
Lump	lb.	—
Potassium Bichromate	lb.	—
Carbonate, 34-36%	lb.	—
Cyanide, 98-99½%	lb.	—
Sulphocyanide	lb.	—
Pumice, ground	lb.	—
Quartz, powdered	ton	—
Official	oz.	.73⅝
Rosin	lb.	.08
Rouge, nickel	lb.	.45
Silver and gold	lb.	.60
Sal Ammoniac (Ammonium Chloride)	lb.	—
Sal Soda	lb.	.05
Silver Chloride, dry	oz.	—
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	66.83
Soda Ash, 58%	lb.	.08
Sodium—		
Biborate, see Borax	lb.	.15
Bisulphite	lb.	.15
Cyanide	lb.	.37
Hydrate (Caustic Soda)	lb.	.15
Hyposulphite	lb.	.08
Nitrate, tech.	lb.	.10
Phosphate	lb.	.14
Silicate (Water Glass)	lb.	.05
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.35
Sulphur (Brimstone)	lb.	.10
Tin, Chloride	lb.	.75
Tripoli Composition	lb.	.06
Verdigris, see Copper Acetate	lb.	—
Water Glass, see Sodium Silicate	lb.	.05
Wax—		
Bees, white ref. bleached	lb.	—
Yellow	lb.	*60
Whiting	lb.	.05
Zinc, Carbonate	lb.	.30
Chloride	lb.	.35
Cyanide	lb.	.50
Sulphate	lb.	.12

COTTON BUFFS

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth	base,	$70.20
14 " 20 " 64/68 "	"	92.50
12 " 20 " 84/92 "	"	83.55
14 " 20 " 84/92 "	"	108.35

Sewed buffs per pound.

Bleached and unbleached	base,	52c.
Colored	"	49c

FELT WHEELS

White Spanish—

Diameter	Thickness	Price
6 to 20 inches, inc.	½ inch or under	$3.05 per lb.
6 to 20 inches, inc.	⅝ inch to ⅞ inch, inc.	2.95 "
6 to 9⅞ inches, inc.	1 inch to 3 inches, inc.	2.75 "
10 to 16 inches, inc.	1 inch to 3 inches, inc.	2.65 "
18 to 20 inches, inc.	1 inch to 3 inches, inc.	2.75 "
6 to 20 inches, inc.	over 3 inches	2.75 "

Grey Mexican—

Diameter	Thickness	Price
6 to 20 inches, inc.	½ inch or under	$2.95 per lb.
6 to 20 inches, inc.	⅝ inch to ⅞ inch, inc.	2.85 "
6 to 9⅞ inches, inc.	1 inch to 3 inches, inc.	2.65 "
10 to 16 inches, inc.	1 inch to 3 inches, inc.	2.55 "
18 to 20 inches, inc.	1 inch to 3 inches, inc.	2.65 "
6 to 20 inches, inc.	over 3 inches	2.65 "